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**Psychosocial demands in small and medium-sized  
enterprises - an integrative literature review**

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Für meinen Opa Hermann Rau, der meine Promotion leider nicht mehr erlebt hat, aber sicher sehr stolz auf mich gewesen wäre.

Und für meine Familie, die mich tatkräftig unterstützt hat.

## **Preface**

Prior to writing this dissertation, essential aspects of the dissertation project were published in the form of a scientific manuscript, of which I am the first author (Schreibauer EC, Hippler M, Burgess S, Rieger MA, Rind E. Work-Related Psychosocial Stress in Small and Medium-Sized Enterprises: An Integrative Review. *Int J Environ Res Public Health*. 2020 Oct 13;17(20):7446. Impact Faktor (2020): 2,849, Q1 of the respective category “Public, Environmental & Occupational Health”; Social Sciences Citation Index (SSCI)). In this publication, the research question, methodology and results of the integrative literature review were presented more condensed and with the omission of some aspects compared to the present dissertation thesis. In addition, the introduction and the discussion of this thesis are more detailed and broader than in the scientific publication and refer to actual scientific literature. Due to methodological considerations, no updated systematic literature search was performed between submission of the manuscript (Schreibauer et al. 2020) and the writing of this thesis (for details please see section 4.2.). In places where I quote text passages, tables or figures from the aforementioned scientific publication unchanged, these are marked as citations.

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## List of abbreviations

APA	American Psychological Organisation
ASEAN	Association of Southeast Asian Nations
BAuA	Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
BSP	Business Source Premiere
CEN	European Committee for Standardization
CSI	Comprehensive Subject Index
EEC	European Economic Community
EIB	European Investment Bank
EIF	European Investment Fund
ESENER	European Surveys of Enterprises on New and Emerging Risks
EU	European Union
EU-28	The 28 member-states of the European Union between July 1, 2013 and January 31, 2020.
EU-LFS	European Union - Labour Force Survey
EU-OSHA	European Agency for Safety and Health at work
GDA	Gemeinsame Deutsche Arbeitsschutzstrategie
IASV	Institut für Arbeitsmedizin, Sozialmedizin und Versorgungsforschung der Universität Tübingen
IfM	Institut für Mittelstandsforschung
ILO	International Labour Organization
ISIC	International Standard Industrial Classification of All Economic Activities
ISO	International Organization of Standardization
JBI	Joanna Briggs Institute
JA MH-WB	Joint Action for Mental Health and Wellbeing
KMB	Kleine- und mittlere Betriebe
KMU	Kleine und mittlere Unternehmen
LCSH	Library of Congress Subject Headings
MeSH	Medical Subject Heading
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne

NLM	National Library of Medicine (U.S.)
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QRCI	Qatar Computing Research Institute
RCT	Radomized Controlled Trial
SME	Small and Medium-sized Enterprises
SURE	Specialist Unit for Review Evidence
WERS	Workplace Employment Relations Study
WHO	World Health Organization
ZPID	Leibniz Institute for Psychological Information and Documentation

## 1 Introduction

The changing economic environment since the beginning of the 21st century due to e.g. increasing globalization and digitalization (and the accompanying digitization) has contributed to a rapidly progressing transformation of industry and a transition to an Industry 4.0 that is now in progress. The digitalization that emerged was accompanied by greater rationalization of work and led to a densification of work, higher work pace and high demands on flexibility and social skills (Prisecaru 2016). Already at the beginning of the 21st century, an increase in work density and performance pressure among employees was noted, which was associated with improved performance measurement through the use of computer systems, a change in work organizations and also a change in employee effort (Green 2004). These changes have been linked to an increase in work-related psychological stress (Prisecaru 2016). According to the 'European Union - Labour Force Survey' (EU-LFS) 2020 (eurostat 2021), after musculoskeletal complaints, perceived stress, depression and anxiety ranked second among reported work-related health problems.

On the one hand, in a healthy working atmosphere, psychosocial demands can have a challenging and stimulating effect that leads to improved employee's mental and physical health and performance. On the other hand, prolonged psychosocial demands that exceed the capacities, resources and coping capabilities of the employee can lead to negative mental stress and, as a long-term consequence, to mental disorders or illnesses (Bonde 2008; Harvey et al. 2017; Madsen et al. 2017) as well as psychosomatic or somatic diseases (Paridon and Mühlbach 2016; Theorell et al. 2016; Yang et al. 2016), resulting in high costs not only for the individual, but also for society (Hassard et al. 2014). Compared to aspects of physical health, affected by physical risks like ergonomics, air quality, lighting, etc., psychosocial risks at the workplace have long been unnoticed by legislators and employers. However, in recent decades, psychosocial risks at work have emerged as "a key public health concern" (Leka et al. 2010, p. 89) because of their impact on physical, mental, and social health (Leka et al. 2010).

Due to their significant impact on incapacity for work and health care costs, possible critical attributes of psychosocial demands in the work patterns of work content, work intensity, and social environment have gained attention of European policy makers and national and international occupational safety and health institutions for several years (EU-OSHA 2005; Eurofound and EU-OSHA 2014; Houtman et al. 2007).

In 2016 the Joint Action for Mental Health and Wellbeing (JA MH-WB) of the European Union (EU) provided a “Framework for Action on Mental Health and Wellbeing” which also contained the requirement to reduce psychosocial risk factors that may cause stress in occupational context (JA MH-WB 2016, p.8). As a result, psychosocial stress is playing an increasingly role in occupational safety regulations in the EU.

### **1.1 Occupational health and safety legislation**

The International Labour Organization (ILO) has developed international labor standards that provide a framework for national legislatures to enable decent and productive work in conditions of freedom, equality, security and dignity for everyone (Declaration of Philadelphia from 1944 (ILO 1944)), to ensure that the growing global economy benefits all people worldwide. Both, conventions (legally binding international treaties ratified by member states), and recommendations (non-binding guidelines) have been developed to serve this purpose and establish basic labor rights and principles (ILO 2016). Some examples are the Convention on Occupational Safety and Health, 1981 (No.155) and its accompanying recommendation (No.164), the Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171) and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) and its accompanying Recommendation (No. 197) (ILO 2016). The prevention of work-related health hazards that may cause accidents or illness, is the aim of these conventions. According to ILO the relationship between employees and their work environment in terms of physical and mental capabilities should be considered when adapting machinery, procuring

equipment, arranging working hours and work procedures and organizing work to reduce work-related risks. (ILO 2016, p.11).

In Europe, the Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work (European Union 2003) is the basis of the legal obligation for employers to prevent or at least minimize risks to employees. Among various requirements, this directive stipulates the employer to assess physical (e.g. ergonomic aspects, light, etc.) and psychological (e.g. a monotonous working environment, emotional burdens) health and safety risks and implement measures to prevent or at least reduce such risks.

The German implementation of this directive is the Safety and Health at Work Act (German Bundestag 1996) which explicitly obliges the employer to identify and evaluate work-related health hazards as part of a risk assessment and to take appropriate measures to reduce these risks. In this context, not only physical aspects (e.g. the ergonomic considerations of workplace design and furnishing), but also “psychological stress at work” (section 5 (3) sentence 1 no.6 of Safety and Health at Work Act) are to be identified. However, it should be remarked that an explicit naming of psychological stress was introduced into the legislation only in 2013 in order to highlight this aspect for all occupational health and safety stakeholders. This can be understood as a response to the European Commission's focus on psychosocial risks at the workplace after the World Health Organization (WHO), the ILO and other occupational health and safety organizations had already pointed out the importance of psychosocial risks for the health of employees and the associated financial burdens (e.g. Kortum et al. 2010; Leka et al. 2010).

Although guidelines for reducing mental health risks in the workplace have been discussed since the very beginning of the 21st century (Papkalla and Collison 2017), as of yet, only few countries have implemented existing guidelines into their national occupational health and safety legislation (EU-OSHA 2005). Furthermore, only single countries have developed specific regulations on psychosocial risks e.g., the Belgian Royal Decree on the Prevention of

Psychosocial Risks at Work of 2014 or the Colombian Resolution 2646 on Risk Assessment and Management of Psychosocial Hazards of 2008 (ILO 2016). Unfortunately, there is little evidence whether and how these recommendations and measures can be implemented at all in an environment with low financial and human resources, e.g. in small and medium-sized enterprises (SMEs) (EU-OSHA 2005; c.f. Schreibauer et al. 2020).

## **1.2 Small and Medium-sized Enterprises**

SMEs account worldwide for the majority (>90%) of the non-financial business economy and employ over 60% of all workers (ASEAN 2019; eurostat 2011; Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry 2018; SBA 2021); they therefore have a major impact on the socio-economic well-being of countries all over the world (Schreibauer et al. 2020). SMEs are considered the backbone of the European economy and are fundamental to the competitiveness and prosperity of Europe, as well as economic and technological sovereignty (EC et al. 2016). Furthermore, especially in local and regional communities they are perceived as key players and important employers (EU-OSHA 2005). Trade integration, globalization and industry consolidation mean that large companies are becoming larger and thus more important for a country's economic development or its economic output; at the same time, they are more affected by international economic cycles than SMEs, which can be particularly significant in times of economic depression (Papadopoulos et al. 2022). In Germany, for example, this was particularly noticeable at the beginning of the COVID-19-pandemic, when a high proportion of SMEs responded to the crisis with innovations and changes to their product range (Zimmermann and KfW 2020), even though they are still heavily affected by the crisis, especially financially (Zimmermann and KfW 2021), and the long-term economic impact of the corona pandemic and, more recently, the war in Ukraine cannot yet be predicted.

It is therefore not surprising that the EU has been taking targeted measures to support and promote SMEs since 2008 with its "Small Business Act" (EC 2008). In the context of the pandemic events in March 2020, the Small Business Act was

relaunched as a new SME strategy focusing on digitalization and green innovations (EC 2020). In Germany, SMEs are moreover resilient to global influences such as takeovers by international corporations (Statistisches Bundesamt 2014), create one in two new jobs and provide the majority of apprenticeships (IfM 2020).

SMEs employ over 60% of all employees (see above) and therefore play a major role in maintaining the health of the working population. But mainly SMEs indicate fewer measures to prevent mental risks, as the European ESENER surveys (EU-OSHA 2010; EU-OSHA 2020b) with a closer look on emerging risks (EU-OSHA 2015) have shown. There is also evidence of this issue in Germany. Looking at the implementation of the Occupational Health and Safety Act, surveys in 2011 and 2015 (Hägele and Fertig 2018) indicated that only 53% of all companies had carried out risk assessments and less than 40% had documented mental health risks (c.f. Schreibauer et al. 2020). In German SMEs the proportion was even lower: only 38% of them documented risk assessments and only 6% reported assessing psychosocial risks (Hägele and Fertig 2018, c.f. Schreibauer et al. 2020). Occupational health and safety (OHS) management has a rather low priority among SMEs due to their limited human and financial resources and their internal structure (Cunningham et al. 2014; EU-OSHA 2005). To facilitate the process of implementing legal requirements for SMEs, several tools have been developed by European and German OHS institutions to support SMEs in e.g. doing risk assessments (EU-OSHA 2020c; Kleinschmidt 2012; Offensive Mittelstand and Ehnes 2016). These tools are based on various theoretical models of stress in the workplace, which will be briefly described in the following section.

### 1.3 Work-related mental stress

Mental stress at the workplace has been researched worldwide for decades. Since the end of nineteenth century various theoretical models for work-related stress have been developed of which the most commonly used are presented below.

The **Stress-Strain Model** of Rohmert was developed as early as 1984 and is still one of the basic principles of occupational health and safety management and occupational medicine today (Rohmert 1984). The terms stress and strain first gained application in the field of ergonomics. Both terms were used in a neutral meaning and should be evaluated neither positively nor negatively. Stress refers to all external influences affecting the individual. Strain is used to describe the changes that occur in an individual as a result of exposure to stress.

The **Job-Demand-Control Model** from Karasek and Theorell (Karasek 1979; Karasek and Theorell 1999) is based on the assumption that a combination of job demands and freedom of decision-making (control) leads to four different types of jobs. Low demands and low job control lead to a passive job with low development possibilities. High demands in combination with high control results in an active job, which has a stimulating effect resulting in personal development. High job control and low demands result in a low strain job. A 'high strain' job is the result of high demands in combination with low decision latitude and results in a high risk of mental or somatic disorders. This model was extended by Johnson and Hall to include the aspect of social support and was henceforth called the Job-Demand-Control-Support Model (Johnson and Hall 1988).

The **Effort-Reward-Imbalance-Model (ERI)** from Siegrist is based upon the principle of "social reciprocity", in which a reward in the form of money, respect and/or career opportunities is expected for the effort made. According to the model, high effort combined with low reward is associated with strong negative emotions and stress reactions, which can have long-term negative effects on health. A specific pattern of coping with demanding situations (over-commitment, OC) leads to increased vulnerability to these stress responses (Siegrist 1996; Siegrist and Li 2017).



**Organizational Justice** is a more recently developed theory that addresses aspects of fairness, justice and equity in the workplace. A lack of organizational justice seems to be a risk for the health of employees (Elovainio et al. 2002).

Based on these theoretical models, various international as well as German national Occupational Health and Safety (OHS) organizations, e.g. ILO, WHO, European Agency for Safety and Health in Europe (EU-OSHA), German Federal Institute for Occupational Safety and Health [Bundesanstalt für Arbeitsschutz und Arbeitsmedizin] (BAuA), Joint German Occupational Safety and Health Strategy [Gemeinsame Deutsche Arbeitsschutzstrategie] (GDA) and international standard institutions like the German Institute for Standardization [Deutsches Institut für Normung e.V.] (DIN), the European Committee for Standardization (CEN) and the International Organization of Standardization (ISO), have developed definitions and guidance on mental stress in the workplace with a range of different psychological (and social) factors. Chapter 2.3.2, Table 2 shows a supplementary tabular overview of categorization of psychosocial work pattern according to different organizations.

An international definition can be found in the standard DIN EN ISO 10075-1:2018-01 (ISO 2018). According to this standard, mental stress refers to all external influences that affect a person psychologically. Mental strain is the immediate (not long-term) effect of mental stress on an individual, depending on respective conditions and available resources, including individual coping strategies. It can have positive and negative effects and is different for each person individually. The term "mental" in this definition is intended to cover all processes of human behavior and experience and therefore comprises informational, cognitive, and emotional processes, which affect each other and therefore can only be assessed separately to a limited extent (ISO 2018).

Consequences of mental strain were mentioned in Table1 of DIN EN ISO 10075-1:2018-01: Mental strain can result in facilitating short-term effects like activation or warming up, or in impairing short-term effects like fatigue or reduced vigilance (ISO 2018, p.13). As long-term effects, in a positive scenario, competencies can be expanded and health can be improved. Negative consequences of prolonged

impairing mental strain can be found on a cognitive level (e.g. concentration disorders, reduced attention), on an emotional level (e.g. tension, sadness), on a social level (e.g. aggressive behavior, withdrawal), but also on a physiological level (e.g. cardiovascular reactions, musculoskeletal disorders, headache) and can consequently result in early retirement (BAuA 2010). These negative consequences affect the individual as well as organizations and social systems and, in consequence, the society (BAuA 2010).

The following factors contributing to mental stress were mentioned in DIN EN ISO 10075-1:2018-01 (ISO 2018): task requirements like sustained attention, information processing, responsibility, duration of action, task content and danger; physical conditions like lighting, climatic conditions, noise, weather, odors; social and organizational factors” like type of organization, organizational climate, group factors, leadership, conflicts, social contacts; societal factors like social demands, cultural standards and economic situations.

The WHO divides stress-related harms at the workplace in two groups with subordinate psychological and social factors (WHO 2004): work content: containing the factors job content; workload and work pace; working hours; participation and control. Work context: with the factors career development, status and pay; role in the organization; interpersonal relationships; organizational culture; home-work interface.

The International Labour Organization (ILO) specifies also two categories with subordinate psychosocial factors respectively hazards: “work content” containing “work environment and work equipment; task design; workload/workplace; work schedule” and “work context” containing “organizational culture and function; role in organization; career development; decision latitude / control; interpersonal relationships at work; home-work interface” (ILO 2016, p.3).

According to the website of EU-OSHA, poor work design and work organization, an unhealthy management and poor social context result in psychosocial risks, which can be just as manageable as any other workplace safety and health risk (EU-OSHA 2020d). Psychological workplace factors were classified in five main categories: “job content”; “work intensity and job autonomy”; “working time

arrangements and work–life balance”; “social environment”; “job insecurity and career development” (Eurofound and EU-OSHA 2014, p.14).

From 2014 to 2017, the German Federal Institute for Occupational Safety and Health (BAuA - Bundesanstalt für Arbeitsschutz und Arbeitsmedizin) worked on a project that evaluated the available current state of scientific knowledge of psychosocial factors in the workplace (Rothe et al. 2017).

A theoretical framework was developed, categorizing working condition factors into four subject areas: “working task”, “leadership and organization”, “working time” and “technical factors” (Rothe et al. 2017, p.23). Several reviews, done for this project, report the current state of research on these working factors, without, however, focusing on specific groups of employees.

To support companies and occupational safety actors (e.g. employers, workers and staff councils, company physicians and specialists for occupational safety) in doing risk assessment of psychosocial demands at the workplace, the GDA published a brochure with recommendations within the psychosocial risk assessment as well as psychosocial demands at work were described (Beck et al. 2014). Part of this brochure is a table, in which the psychosocial factors are shown in a classification of five work patterns: “job content/working task”; “organization of work”; “social relations”; “working environment”; “new forms of work” (Beck et al. 2014, p.17). These work patterns are similar but not identical to the five classifications defined by EU-OSHA. The term “psychosocial factors” encompasses both, psychological and social aspects, which is why it will be used in this thesis.

#### **1.4 Study-design and objectives**

In recent years, small and medium-sized enterprises have been underrepresented in research and generally seem to be less in the focus of institutions compared to their economic importance. However, this seems to be changing. Knowledge of relevant work-related psychosocial factors is imperative for researchers and company actors to develop interventions and tools for psychosocial risk reduction in SMEs. This thesis has therefore the objective to summarize and categorize the current evidence on psychosocial factors,

contributing to work-related psychological stress in small and medium-sized enterprises.

Therefore, a systematic review was conducted to identify knowledge gaps and provide a systematic overview of the psychosocial factors, outcomes and economic sectors that have been considered to date (Schreibauer et al. 2020).

The subsequent research questions guided the review-process:

1. “What is the current state of knowledge on psychosocial factors in SMEs?”
2. “Which outcomes and economic sectors have been examined?” (c.f. Schreibauer et a. 2020, p.3)

## **2 Methods**

### **2.1 Study design**

The number of publications is increasing rapidly every year, making it more difficult for researchers, physicians in private practice or clinical practitioners to gain an overview of the current state of research (Ressing et al. 2009). Systematic reviews provide an overview of the current state of knowledge on a research question at a given point in time (Ressing et al. 2009) and help to summarize inconsistent study results and evidence on specific topics from different research fields (Jahan et al. 2016), explaining their increasing importance in recent years. Performing a systematic review includes a systematic literature search in at least one database, a careful selection of studies according to previously defined inclusion and exclusion criteria, and an analysis and clearly arranged presentation of results of included studies (Jahan et al. 2016; Ressing et al. 2009; Schmucker et al. 2013). Depending on the research question and the consistency of the studies included in the review, the results may in some cases be summarized in a meta-analysis (Ressing et al. 2009).

For improving methodological quality of studies and reviews and thus improving the quality of evidence in medicine, the Cochrane Collaboration is engaged in helping researchers and reviewers by publishing the Cochrane Handbook for Systematic Reviews since 2005. The handbook is regularly updated and can be

accessed online (<https://training.cochrane.org/handbook>, last assessed July, 18<sup>th</sup> 2022). It is designed to identify and avoid systematic errors (bias). Similar to the Cochrane Collaboration, the Joanna Briggs Institute (JBI) has developed manuals for the preparation of systematic reviews which were constantly updated (<https://jbi.global/ebp#jbi-manuals>, last assessed September, 5<sup>th</sup> 2022). As more and more applications and fields of research for literature reviews have emerged in recent years, different review forms have been developed for the different applications. For example, the "JBI Manual for Evidence Synthesis" (Aromataris and Munn 2020) listed the following review types: Systematic reviews of experiences or meaningfulness, systematic reviews of effectiveness, systematic reviews of text and opinion/policy, systematic reviews of prevalence and incidence, systematic reviews of costs of a certain intervention, process, or procedure, systematic reviews of etiology and risk, systematic reviews of mixed methods, systematic reviews of diagnostic test accuracy, umbrella reviews and scoping reviews.

The research questions in the review presented in this thesis were not suitable for the preparation of a traditional systematic review (e.g. according to the Cochrane or JBI criteria). The main objective of this review was to explore what psychosocial demands have already been researched in the various characteristic areas of mental stress. This required a rather broad and unrestricted search. The research questions were not, as usual in a Cochrane review, based on a research question similar to those of primary literature (e.g. including only intervention studies). A pilot search with search terms on the setting "small and medium-sized enterprises" and terms on "psychological stress" showed, that rather few studies with inhomogeneous designs (qualitative and quantitative) could be expected and those could not be synthesized with a traditional systematic review.

Whittemore and Knaf's integrative review methodology (Whittemore and Knaf 2005) fitted best the above-mentioned research questions, which is why it was chosen as the underlying methodology for this review. It allowed for a synthesis of qualitative and quantitative research in the form of an integrative review and included the following steps: problem identification, literature search, data

evaluation, data analysis and presentation of results (Whittemore and Knafli 2005). The presentation of results was based on the methodology of evidence mapping as described by Schmucker et al. (2013). Evidence mapping is an increasingly used method, especially on an international level, to obtain information on the current state of research, e.g. on public health measures

## **2.2 Development of the search strategy**

The use of a search tool provides an organizing framework for the main terms of the search query (Methley et al. 2014). In line with the development of new forms of reviews in recent years, various search tools have been developed for use in the different review forms.

The PICO-scheme, the most common and well-known framework for literature search, was originally designed for quantitative systematic reviews. Application of this template is recommended by the Cochrane Collaboration for preparing systematic reviews. The research question and the search strategy should be structured according to the following criteria: P - patient/population, I - intervention, C - comparator/comparison intervention, O - outcome/endpoint. A research question developed according to this scheme is well delineated and allows logical replication and reproducibility of results (Higgins and Green 2011).

As reviews of atypical research questions gained importance in the medical sciences, other schemata have been developed in recent years to improve the detection of special study-designs. For research questions on qualitative aspects (e.g. reasons for the effectiveness of an intervention), the PICOS-scheme can be used (CRD 2009). The additional category S –Study design allows a search specifically for e.g. qualitative studies.

The SPIDER-scheme has also been developed to facilitate the identification of qualitative literature (Cooke et al. 2012). SPIDER is composed of S - Sample, P - Phenomenon of Interest, D - Design, E - Evaluation, R - Research type and was evaluated by Methley (Methley et al. 2014).

PICO-, PICOs or SPIDER were only of limited use to answer the research questions of this review because, as described above, the main question of this thesis "Which psychosocial factors have been researched in SMEs?" is of rather

explorative nature requiring a broad search perspective including qualitative and quantitative research.

Another scheme commonly used in the medical sciences for systematic reviews is the PEO scheme (Bettany-Saltikov and McSherry 2016). While P stands for population, E represents exposure, and O outcome. This framework remains rather simple and is suitable for questions that are broader in scope and, in particular, do not require a comparison group. The PEO is thus particularly well suited to the questions examined here and was selected for this review.

### **2.3 Definition of central concepts applied within the PEO scheme**

For the selection of relevant studies, the following concepts were applied using the PEO scheme: the workforce in SMEs represented the “population of interest”, psychosocial risk factors were considered as “exposure”. As the approach of this review was explorative, the third aspect “outcome” was not specified.

#### **2.3.1 Small and medium-sized enterprises (Population)**

In 2003, the European Commission published a definition of small and medium-sized enterprises (SMEs) in the European Official Journal. A definition of the terms at EU level was necessary in order to standardize (support-) measures for small and medium-sized enterprises in all member states and to avoid tendencies of individual member states to restrict themselves on only one type of small and medium-sized enterprise (EC 2003). Furthermore, the efficiency of the measures should be increased by standardizing the terminology, also for the European Investment Bank (EIB) and the European Investment Fund (EIF). The above-mentioned measures also include EU structural and research funds.

The most important criterion designated in this definition is staff numbers, accompanied by financial criteria such as turnover and balance sheet. The European definition is shown in Table 1.

**Table 1** *European definition of SMEs adopted from European Commission (EC 2003)*

Type of enterprise	Number of employees	Annual turnover		Annual balance sheet total
Microenterprise	< 10	≤ EUR 2 million	or	≤ EUR 2 million
Small enterprise	< 50	≤ EUR 10 million	or	≤ EUR 10 million
Medium-sized enterprise	< 250	≤ EUR 50 million	or	≤ EUR 43 million

### 2.3.2 Psychosocial factors (Exposure)

As described above, a variety of definitions of work-related psychological stress with a number of related factors currently exist. An overview of the above mentioned psychological and social factors is shown in Table 2.

As can be seen from this table, there is a lot of overlap in the subheadings of the categorizations, but there are also some differences. Many aspects like job content, task design, work intensity/work load, etc. can be found across all categorizations of work patterns. However, there are also quite noticeable differences. “New forms of work”, for example, is explicit mentioned in the GDA-recommendations whereas WHO alone also includes societal factors. The GDA recommendations are designed to assess psychosocial risks at work including to derive protective measures. They include a very detailed and systematic table (which has been included in abbreviated form as the right column in Table 2) with a very broad selection of factors and is the only scheme to provide a category for new forms of work. The GDA-table provided a useful framework for the allocation of studies identified in this review. Therefore, the compilation of factors from the GDA-recommendations was chosen as template for this thesis.



**Table 2** *Categorization of psychosocial work pattern according to different organizations*

Annotation: Self-created table, the contents are taken from the sources mentioned in the column headings.

<b>DIN EN ISO 10075-1:2018-01 (ISO 2018)</b>	<b>WHO (WHO 2004)</b>	<b>ILO (ILO 2016)</b>	<b>EU-OSHA (Eurofound and EU-OSHA 2014)</b>	<b>BAuA (Rothe et al. 2017)</b>	<b>GDA-Recommendations (Beck et al. (2014), ; Beck et al. 2017p.17-20)</b>
<b>Task requirements e.g.</b> <ul style="list-style-type: none"> <li>• Sustained attention</li> <li>• Information processing</li> <li>• Responsibility</li> <li>• Duration, temporal pattern and temporal position of action</li> <li>• Task content</li> <li>• Danger</li> </ul>	<b>Work Content</b> <ul style="list-style-type: none"> <li>• Job content</li> <li>• Workload and work pace</li> <li>• Working hours</li> <li>• Participation and control</li> </ul>	<b>Content of Work</b> <ul style="list-style-type: none"> <li>• Work environment and work equipment</li> <li>• Task design</li> <li>• Workload/workplace</li> <li>• Work schedule</li> </ul>	<b>Job content</b> <ul style="list-style-type: none"> <li>• type of tasks</li> <li>• contact with people through work (such as clients</li> <li>• changes in processes</li> <li>• restructuring and use of skills</li> </ul> <b>Work intensity and job autonomy</b> <ul style="list-style-type: none"> <li>• Workload</li> <li>• Work pace</li> <li>• Control</li> </ul>	<b>Working task</b> <ul style="list-style-type: none"> <li>• Latitude for activity at work</li> <li>• Work intensity</li> <li>• Disturbances and interruptions</li> <li>• Emotional labor</li> <li>• Traumatic stresses</li> </ul> <b>Working Time</b> <ul style="list-style-type: none"> <li>• Atypical working time</li> <li>• Rest breaks</li> <li>• Detachment</li> <li>• Mobility</li> <li>• Work-life balance</li> <li>• Work-related permanent availability</li> </ul>	<b>Work content and task</b> <ul style="list-style-type: none"> <li>• Completeness of task</li> <li>• Freedom of action</li> <li>• Variability</li> <li>• Information/supply of information</li> <li>• Responsibility</li> <li>• Qualification</li> <li>• Emotional demands</li> </ul> <b>Organization of work</b> <ul style="list-style-type: none"> <li>• Work time</li> <li>• Work process</li> <li>• Communication / Cooperation</li> </ul>
<b>Physical conditions e.g.</b> <ul style="list-style-type: none"> <li>• Lighting</li> <li>• Climate conditions</li> <li>• Noise</li> <li>• Weather</li> <li>• Odors</li> </ul>				<b>Technical factors</b> <ul style="list-style-type: none"> <li>• Noise</li> <li>• Lighting</li> <li>• Climate</li> <li>• Human-machine interaction</li> </ul>	<b>Working environment</b> <ul style="list-style-type: none"> <li>• Physicochemical factors (Noise. Lighting, Hazardous substances)</li> <li>• Physical factors</li> <li>• Workplace and information structure</li> </ul>

				• Human-computer interaction	• Work equipment
<b>Social and organizational factors</b> e.g. • Type of organization • Organizational climate • Group factors • Leadership • Conflicts • Social contacts  <b>Societal factors</b> e.g. • Social demands • Cultural standards Economic situation	<b>Work Context</b> • Career Development, Status and Pay • Role in the Organization • Interpersonal Relationships • Organizational Culture • Home-Work Interface	<b>Context of Work</b> • Organizational culture and function • Role in organization • Career development • Decision latitude / Control • Interpersonal relationships at work • Home-work interface	<b>Social environment</b> • Interpersonal relationships at work • Social support  <b>Working time arrangements and work-life balance</b> • working hours • irregular working time arrangements • work-life-balance  <b>Job insecurity and career development</b> • Perceived job insecurity • Fairness and reward Career prospects	<b>Leadership and Organization</b> • Leadership • Social relationships • Organizational justice • <i>Atypical forms of employment</i> • Job insecurity	<b>Social relations</b> • Colleagues • Managers
				• <i>Atypical forms of employment (see section above)</i>	<b>New forms of work</b> • Geographic mobility • Atypical forms of employment • Discontinuous work history • Flexibility in terms of time • Division between work and private life

### **2.3.3 Outcomes**

The BAuA project (Rothe et al. 2017) provided a categorization of outcomes in which the domains of health, well-being, performance, cardiovascular system, musculoskeletal system, mental disorders, motivation, and job satisfaction were selected as outcomes for the preparation of its scoping reviews. For this dissertation, the BAuA categorization was amended and augmented by a classification for negative outcomes (risks) and positive outcomes (resources) (see Schreibauer et al. (2020)). Mapping the outcomes of the included references provided an overview of which outcomes have been frequently studied and in which areas more research is needed. In addition, the used measuring instruments were also identified to get an overview of assessment methods and quality.

## **2.4 Search String Development**

General recommendation for search strings in occupational health research were considered for the development of the search string for this review (Mattioli et al. 2010). Also, previously published reviews in the topic area (Rothe et al. 2017) were searched for suitable keywords, a more detailed description is provided in chapter 2.4.1.

### **2.4.1 Identification of search terms**

The PEO scheme provided a template for finding suitable keywords.

#### P- Population:

The English terms used by the EU for SMEs are: "micro, small and medium-sized enterprises (SME)". In addition, there are many variations in international literature, such as "small and medium-sized businesses" or "small and medium-sized companies". Various terms were detected by pilot searches and included in the search string. For German literature the term KMU (Kleine und Mittlere Unternehmen) was inserted into the search string. In Austria, the terms "Kleinstbetriebe" (microenterprises) and "Kleine und mittlere Betriebe" (KMB, small and medium-sized enterprises) were also used, especially before the

introduction of the EU definition (EC 2003). Since the studies included could also date back to the years before the EU definition, these terms were also included in the search. In addition, various spellings of the terms commonly used in British and American English were included.

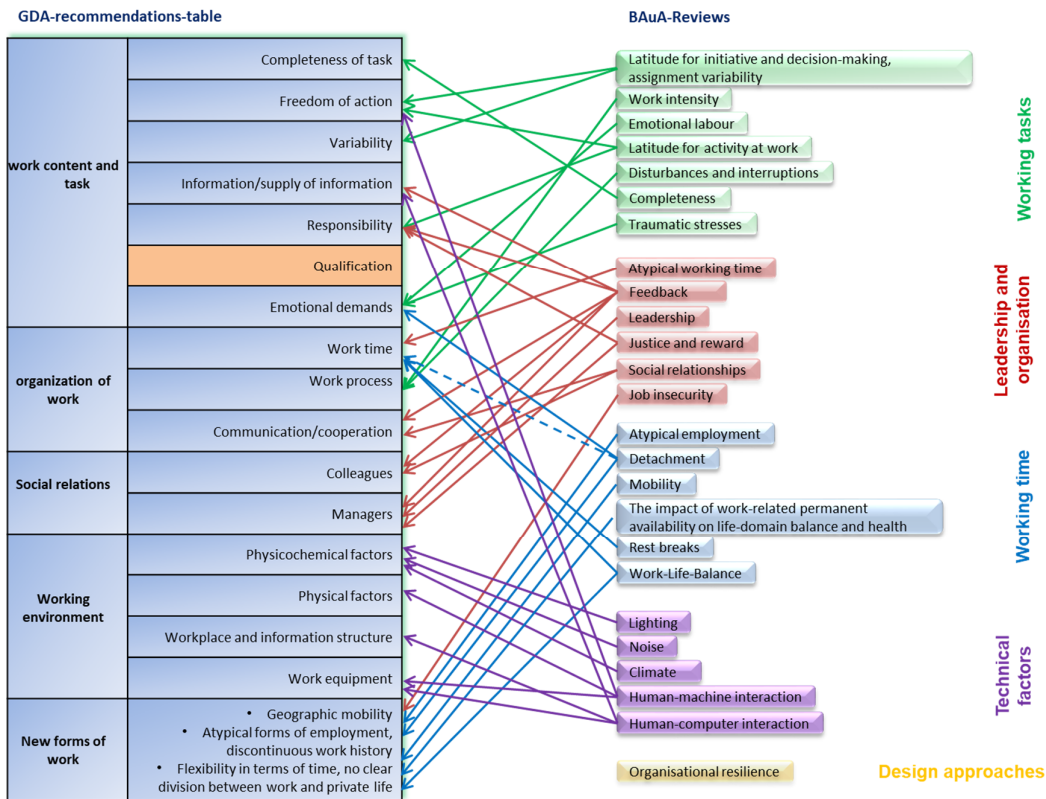
Initially, terms related to "Mittelständische Unternehmen" were also included in the search string in order to find studies keyed to these terms that also fit the EU definition of SMEs (i.e., <250 employees and <€50 MILLION in annual sales). The term "family business", however, indicates nothing about the size of the company. There are global companies with thousands of employees that are still family-owned. An example from Germany is the Liebherr company with almost 50.000 employees ([www.liebherr.com](http://www.liebherr.com), last access: 2022/07/04). Likewise, keywords for family businesses were initially used. Orienting literature searches in the relevant databases showed that these terms resulted in a large and unspecific hit list, since a number of studies on families and their working lives in Africa and other developing countries and also on the financial situation of families in developing countries were included. In addition, studies on family businesses often not provided the size of researched businesses or the number of employees. For these reasons, these terms were deliberately excluded from the search string. All synonyms found for SMEs were interlinked with the operator OR.

### E- Exposure

The search term for "psychosocial factors" was assigned to the variable "exposure".

As shown above, psychological stress at work encompasses various psychosocial factors. The structure of the search string used for this research is based on the GDA recommendations (Beck et al. 2014, p.17-19) for conducting mental risk assessments. Keywords were assigned to each of the five work patterns: job content/working task; organization of work; social relations; working environment and new forms of work, which in turn included several psychosocial factors. This method should guarantee that relevant keywords for all factors were included in the search string. The keywords were also identified based on search

strings already published by those in the aforementioned BAuA project (Rothe et al. 2017). Since the structure of stress factors investigated by BAuA are not identical to the work patterns and psychosocial factors of the GDA guideline (see chapter 2.3.2), the reviews conducted for the BAuA project were first assigned to the 5 work patterns of the GDA guideline. This assignment is shown in Figure 1.



**Figure 1** Comparison of the BAuA and GDA- classifications of psychosocial factors and their assignment to work patterns (self-created diagram based on Rothe et al. (2017) and Beck et al. (2014), p.17)

The assignment was intended to analyze which topic areas were already well represented by the search strings published by the BAuA and where there may still have been gaps. Not only the title of the respective review was considered for assigning, but also the methods and results reported. As an important principle for the construction of the search strategy, the assignment was discussed and finalized in the research group. As shown in Figure 1, it was not possible to find a term corresponding directly to 'Qualification' according to the GDA-classification in one of the BAuA-reviews, therefore keywords had to be added to

this category elsewhere. The BAuA-review on organizational resilience had no equivalent in one of the psychosocial factors of the GDA table and was therefore not considered with regard to the building of search strings

### O - Outcome

Since the research question of this study does not require a specific outcome, no outcome variable was tagged in the search string. However, the included studies were also categorized based on their outcomes which in addition were assessed as “positive” (resources) or “negative” (risks) (see chapter 2.3.3).

#### **2.4.2 Syntax**

The structure of the search string was based on the table of GDA recommendations (Beck et al. 2014, p.17-19). The relevant keywords were assigned to each work pattern (wp) and the corresponding psychosocial factors. These keyword groups were connected with each other using the ‘OR’ operator. In addition, for each database, the MeSH terms corresponding to the work patterns were retrieved from the respective thesaurus of the database. These MeSH terms were then linked with the operator ‘OR’. Since the individual keywords were to be related to psychological stress in the workplace, they were combined with synonyms on psychological stress and psychological strain, identified by pilot searches in literature, and linked with the ‘AND’ operator. In order not to exclude studies in which mental stress/strain was examined without a link to one of the GDA work patterns, the search string on mental stress/strain was appended once again with ‘OR’ to the search string. This complex was then linked to the search string for SMEs with the operator ‘AND’. The SME-synonyms were combined to each other with the ‘OR’ operator.

((wp<sub>1</sub> OR wp<sub>2</sub> OR wp<sub>3</sub> OR ...OR wp<sub>n</sub> OR MeSH terms) AND (stress term<sub>1</sub>  
OR stress term<sub>2</sub> OR stress term<sub>3</sub> OR ...OR stress term<sub>n</sub>)) OR (stress term<sub>1</sub>  
OR stress term<sub>2</sub> OR stress term<sub>3</sub> OR ... stress term<sub>n</sub>)) AND (SME<sub>1</sub> OR SME<sub>2</sub>  
OR SME<sub>3</sub> OR ...OR SME<sub>n</sub>).

---

*wp - work pattern; OR - Boolean search operator; AND – Boolean search operator; SME – synonyms for SMEs; stress term – synonyms for psychological stress; MeSH terms - relevant MeSh terms of the corresponding thesaurus*

The search string was adapted for each database. The complete search strategy for all databases can be viewed in Annex (Table13-Table16).

In accordance with the research question, databases from different disciplines were selected. Since psychological stress plays a major role in occupational medicine and psychosomatic medicine, a medical database was selected with priority. Literature searches were done in PubMed, a search engine of the U.S. National Library of Medicine® (NLM) that searches MEDLINE and other journals. MEDLINE is provided by the U.S. National Library of Medicine® (NLM) and contains more than 25 million references; the database also offers well-organized indexing using NLM Medical Subject Headings (MeSH). PubMed offers a user-friendly interface that ensures low error extraction of references.

The German database PSYINDEX and the English database PsycINFO were selected as psychological databases, since work-related stress is equally researched in industrial psychology and business psychology. PSYINDEX is published by the Leibniz Institute for Psychological Information and Documentation (ZPID) and PsycINFO is published by the American Psychological Organisation [sic!] (APA). Both databases are very comprehensive and offer a thesaurus of keywords for targeted searching which is available in German for PSYINDEX and fully translated for searching in English-language databases, such as PsycINFO, facilitating the correct use of the corresponding technical terms as keywords in both German and English, PsycINFO also includes articles on psychological topics from other disciplines such as sociology and economics, thus allowing broad cross-disciplinary searches. It currently offers over 4 million indexing entries (as of April 2019).

Since mental stress in the workplace is closely linked to economic aspects (see Introduction), a business database, Business Source Premiere (BSP), was also used. Furthermore, publications of business psychology are also partly indexed in business databases. Trial runs revealed good indexing of business psychology topics. PSYINDEX, PsycINFO and BSP were all available through EBSCO at the University of Tübingen. Searching multiple databases through the same interface (EBSCO) was supposed to reduce the risk of application errors.

The provided thesaurus of each database was searched for matching keywords. For PubMed, the suitable MeSH terms, including the hierarchical keyword trees were included (last update considered 2019). The APA Thesaurus of Psychological Index Terms (published by the "American Psychological Association (APA)", last update considered: 2019) was searched for PsycINFO and the PSYINDEX Thesaurus (ZPID 2016) a German version based on the APA-Thesaurus of Psychological Index Terms for the query in PSYINDEX (last update considered: 2019). For Business Source Premiere, the Business Thesaurus was used in the version valid at the time of the search (March 15<sup>th</sup> 2019) This thesaurus is part of the Comprehensive Subject Index (CSI) developed by the EBSCO Information Service and provided for searching in EBSCO databases. CSI, in turn, is based on the Library of Congress Subject Headings (LCSH) thesaurus of the U.S. Library of Congress. By comparing the thesauri of the different databases, additional keywords for the search string could be obtained. Some of these were derived from differing terminology used in the MeSH terms/Psychological Index Terms/Subject Headings as well as from the respective entry terms. EBSCO also provides a "Suggest Subject Terms" feature that was also used to find more keywords. The search queries for all databases are shown in the Annex.

## **2.5 Literature search**

### **2.5.1 Systematic database search**

PubMed, PsycINFO, PSYINDEX, and Business Source Premiere (BSP) were searched on the following dates:

PSYINDEX and BSP: March 15, 2019, PsycINFO: March 16, 2019, PubMed: March 17, 2019.

For each database, a separate project was opened in Citavi, Version 5 (© Swiss Academic Software), into which the data set was imported. Duplicates were already removed automatically by Citavi during import, further duplicates were removed manually. The entire dataset was transferred to Rayyan software for screening by title and abstract (Ouzzani et al. 2016). The free available software can assist in preparation of reviews and was developed by the Qatar Computing



Research Institute (QCRI). It can be used both online via browser or via a suitable application (app) for smartphones. Rayyan offered the benefit of allowing multiple reviewers independently and simultaneously screen and categorize titles, a blind mode prevents the reviewers from influencing each other's decisions.

### **2.5.2 Hand search**

In addition to the systematic search in literature databases, a hand search was done in online sources, e.g. in research networks (Researchgate, Academia), in journals and periodicals of the library of the Institute of Occupational Medicine, Social Medicine and Health Services Research, in the journal 'Arbeitsmedizin Sozialmedizin Umweltmedizin' (ASU), as a publication organ of the German Society for Occupational and Environmental Medicine e. V. [Deutsche Gesellschaft für Arbeitsmedizin und Umweltmedizin e. V.] (DGAUM), in the Cochrane Library and in the publication directory of the DGAUM and the BAuA. A hand search was conducted again in January 2020, which found three additional matching studies (Isahak et al. 2017; Torp 2008; Magnavita 2018).

## **2.6 Definition of inclusion and exclusion criteria.**

The inclusion and exclusion criteria for screening of firstly title and abstract and secondly full text were developed based on the research question and definitions for SMEs and psychosocial factors (see above). At the beginning of title and abstract review process and again at the beginning of full text review process, the inclusion and exclusion criteria were evaluated for specificity. By calculating a kappa coefficient, and through discussion between reviewers, the criteria were sharpened and adjusted accordingly as procedures progressed.

The following inclusion criteria were used:

Population: The number of employees according to the EU definition of SMEs was defined as inclusion criterion. The economic definition criteria for SMEs were not considered, as this criterion has hardly been used in SME studies to date (Cunningham et al. 2014). In addition, surveys of enterprises often record the number of employees, but not their sales or profits, as firms tend to be secretive about this (Cunningham et al. 2014). All studies that investigated enterprises with

fewer than 250 employees were included. In addition, companies had to be ones that generated turnover and participated in the economic cycle. In addition, studies were included that, although the number of employees was not stated, indicated small and medium-sized enterprises as the setting and were conducted in a country where the maximum number of employees for SMEs, as defined by the government at the time of the study, did not exceed 250 employees. For these studies, it was assumed that researchers used the country's own definition. If the setting was not obvious from title and abstract, the study was included in full-text screening.

Exposure: all studies were included that examined at least one of the psychosocial factors in the GDA-table (Beck et al. 2014, p.17-19) or examined occupational mental stress in general (c.f. Schreibauer et al. 2020). Only interventions that addressed the modification of occupational stressors were included.

Outcome: All outcomes were included, no exclusion criteria.

Study design: all study designs from qualitative and quantitative research and reviews were included. Studies should have undergone a peer review process.

Language: the research group decided to limit the studies to German and English (language of the full text). Reasons for this were limited resources to translate studies from other languages; furthermore, most international journals publish in English.

Year of publication: The world of work has undergone major changes in recent decades. In particular, the introduction of digital technology and media as well as increasing globalization led to a changed working world with a variety of new stress factors from the beginning of the millennium (Brun and Milczarek 2007; EU-OSHA 2000; Prisecaru 2016). In order to represent today's working life, the publication period was restricted and only studies from 01.01.2000 onwards were included.

The following exclusion criteria were defined:

Population: Studies whose setting was in the public sector (schools, ministries, military, police, hospitals, etc.), associations and charities were also excluded because these institutions are not subject to the same economic pressures as free market companies. As a result, the stress drivers may also differ. In addition, all studies were excluded whose investigated enterprises had > 250 employees, including affiliates of larger chains.

Exposure: Studies on non-occupational psychological stress were excluded, as well as intervention studies dealing with the improvement of life-style factors (e.g. nutrition, exercise, body weight) in the company setting.

Study design: Interviews, commentaries and reviews (e.g. of books), as well as book chapters and dissertations were excluded.

Language: Studies with main text in languages other than German and English.

Year of publication: Studies published before 01.01.2000 were excluded.

## **2.7 Screening of title and abstract**

The screening of title and abstract was done simultaneously by the two reviewers from 16.04.2019 to 03.05.2019 online in Rayyan, using inclusion and exclusion criteria previously defined by author. To ensure independent screening "blind mode" was used in the Rayyan software. In this mode reviewers' decisions were mutually masked to ensure blinding. The category "undefined" was not assigned by the reviewers, instead a decision was always made regarding "inclusion" or "exclusion". In addition, inclusion or exclusion criteria were named (e.g., wrong population, wrong exposure, wrong publication type (books, dissertations, statements, etc.)) and assigned to articles, which ensured a subsequent overview of the reasons for exclusion of hits.

In case of divergent decision, consensus was reached through joint discussion. If necessary, the inclusion and exclusion criteria for full-text screening were refined and adjusted accordingly. If disagreement or uncertainty about the classification persisted, the corresponding study was submitted to a third reviewer for adjudication.

If a decision could not yet be made because of insufficient information in title and abstract, articles were included in full-text analysis.

The Cochrane Handbook version available online at the time of screening recommended calculation of interrater reliability according to Cohen's kappa, and therefore this was done after completion of the Title/Abstract screening (see chapter 3.2).

The new Cochrane Handbook Version 6.1 (Cochrane 2020) (not yet available online at the time of study selection) no longer recommends calculation of Cohen's kappa but suggested independent screening by 2 reviewers, resolving of disagreements by discussion, solution by a third reviewer in case of disagreement, and documentation of inclusions and exclusions with category, preferably in software, which is also consistent with our methodological approach.

## **2.8 Screening of full texts**

The availability of full texts was determined for all references included from title and abstract screening. Despite of all efforts, full texts were not available for five articles. These articles were excluded (see Annex, Table 17).

In a second step, again by two different reviewers, all full texts were read and analyzed according to the aforementioned inclusion and exclusion criteria. Again, discrepancies in decision were resolved by consensus discussion, unclear articles were reviewed by a third reviewer and final decision was done in consensus. In a final step, further relevant publications were identified from references of included articles and, if full texts were available, also included in full-text analysis, thus proceeding in the same way.

## **2.9 Data selection**

Data selection followed a tabular scheme developed based on the questions and the inclusion and exclusion criteria. Using a table previously discussed in the research group, the following information was extracted:

- Year of publication
- Author

- Country
- Year of data collection
- Topic
- Study design
- Type of enterprise
- Size of study population
- economic sector according to ISIC
- investigated psychological factors according to the characteristic areas of the GDA guideline
- measured variables
- measuring instruments
- Outcomes

After copying key passages from the publications and including them in the table, contents were summarized, shortened and, if necessary, translated to provide a well-structured overview of relevant information. Considering the international dimension of the papers, we used the "International Standard Industrial Classification of All Economic Activities (ISIC), Rev. 4" (DESA 2008), on which the European classification system NACE (European Commission 2008b) and most other national classification systems were based on, for the assignment of studies to economic sectors. For determining study design, if it was not reported, we used the Agency for Healthcare Research and Quality (AHRQ) study design algorithms (Hartling et al. 2010). The outcomes were classified using an amended table according to Rothe et al. (2017) (c.f. Schreibauer et al. 2020).

## **2.10 Critical appraisal**

To evaluate and provide a transparent presentation of the available evidence, a quality assessment of the included studies is recommended (Khan et al. 2011; Plüddemann et al. 2018). This review did not require restrictions on study design, thus assessment tools were selected that allowed quality assessment for multiple study types. The Specialist Unit for Review Evidence (SURE) critical appraisal tools provided instruments for cross-sectional studies (SURE 2018a), for

randomized controlled trials (RCTs) and other experimental studies (SURE 2018c) and for qualitative studies (SURE 2018b). For critical appraisal of narrative reviews, the JBI-Critical appraisal tool for text and opinion (McArthur et al. 2015) was used, one of a series of appraisal tools developed by the Joanna Briggs Institute (JBI).

Quality assessment was carried out by author using the aforementioned instruments. A weighting of study results was not necessary as no meta-analysis of data was intended. Table 12 (Annex) shows the systematic evaluation of study-quality.

### **3 Results**

Some of the results have already been published open access in the special issue "Social Determinants of Mental Health" of the "International Journal of Environmental Research and Public Health" (Schreibauer et al. 2020).

#### **3.1 Database search**

Items from several databases were imported separately into the literature management program Citavi (© Swiss Academic Software GmbH) and then combined into one database. Duplicates of the individual databases were already removed when transferring them to Citavi. While merging the individual databases into a common database, 209 duplicates were removed (automatically and manually). After excluding duplicates, a total of 3449 titles were transferred (see Table 3).

**Table 3** *Display of results per database*

Legend:

\* Duplicates automatically detected by Citavi software during the import.

\*\* Duplicates when merging the results of all databases into one file

Database	Transferred Studies	Duplicates	Total
PubMed	742	0*	742
PsycINFO	800	0*	800
PSYINDEX	294	0*	294
BSP	1826	4*	1822
<b>All databases</b>	<b>3658</b>	<b>209**</b>	<b>3449</b>

### 3.2 Screening

Figure 2 (already published and adopted in original (Schreibauer et al. 2020)) shows the Screening process following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram (Moher et al. 2015).

After duplicates were removed, 3460 studies remained for title and abstract screening, including 11 articles found by hand search. For full-text screening, 116 articles were eligible, of which 45 were included in the full-text analysis.

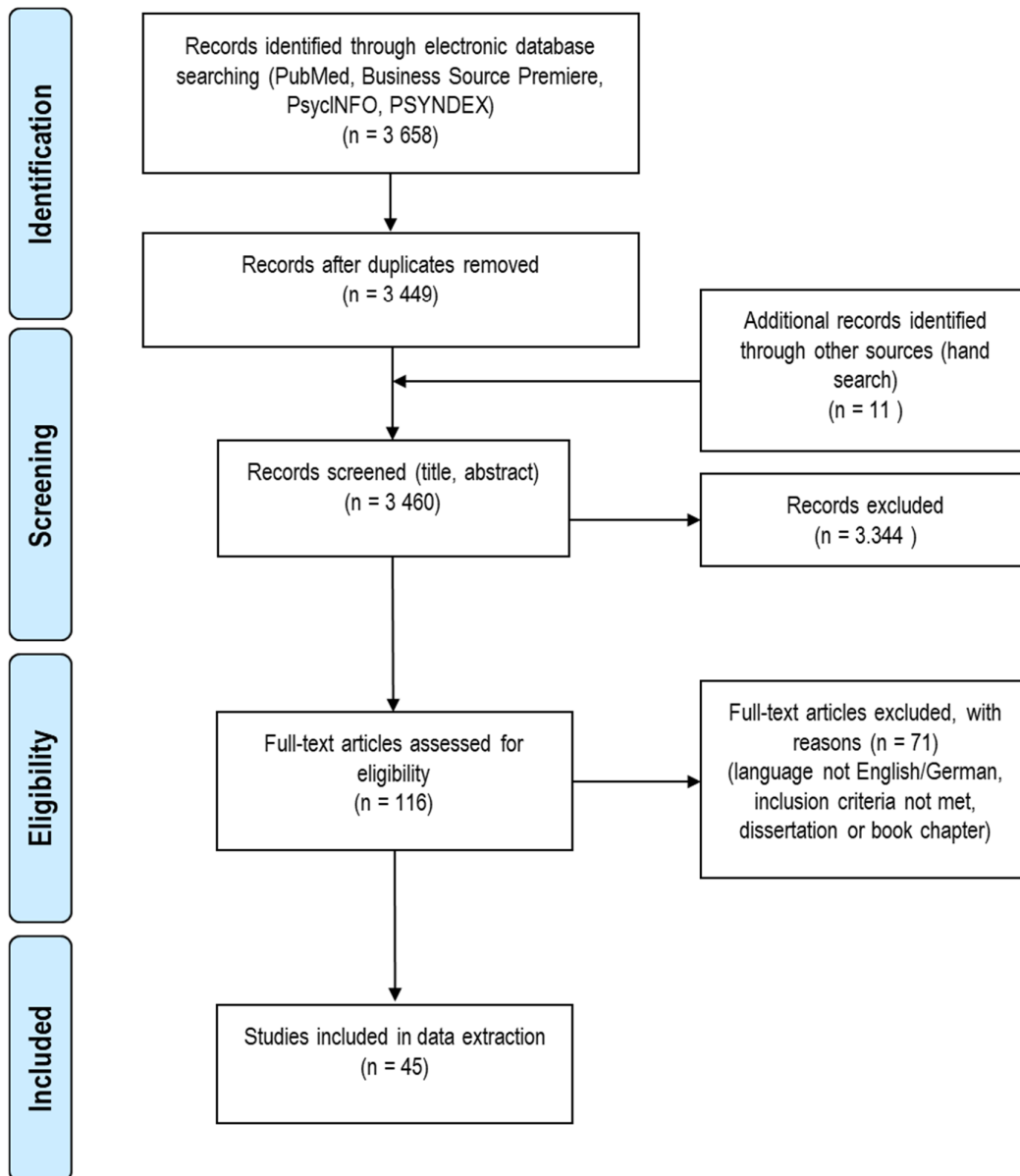


Figure 2: Review process according to PRISMA flow diagram (Moher et al. 2015)\*

\* Adopted originally from Schreiber et al. (2020)

Rayyan provides automatic evaluation of abstract languages. This evaluation shows that the predominant number of studies were published in German or English (>99%) and an international range of studies was available. Most of the full texts of studies with abstracts in languages other than German or English



were written in primary language, few of them provided also abstract and full text in English.

**Table 4** *Number of abstract languages detected by Rayyan*

Legend: en: English, de: German, fr: French, es: Spanish, tr: Turkish, pt: Portuguese, ru: Russian, hr: Croatian, pl: Polish, bg: Bulgarian, et: Estonian, sl: Slovak, it: Italian, ro: Romanian, id: Indonesian, hu: Hungarian

language	en	de	fr	es	tr	pt	ru	hr	pl	bg	et	sl	sk	it	ro	id	nu
number of abstracts	3115	238	18	11	10	6	6	5	4	4	3	3	2	1	1	1	1

After Title and Abstract-screening by two independent reviewers, results were entered into a four-field table to allow calculation of interrater reliability using Cohen's Kappa (see Table 5).

**Table 5** *Results of the title/abstract screening of the two reviewers*

Annotation: In the Cochrane Handbook version 5.1 (Higgins and Green 2011), the calculation was made including the category undefined. However, the category undefined was not assigned here by reviewers.

		Reviewer 2 (SB)		Total
		included	excluded	
Reviewer 1(ES)	Included	45	109	154
	(variable)	(a)	(b)	(I <sub>1</sub> )
	Excluded	69	3197	3266
	(variable)	(c)	(d)	(E <sub>1</sub> )
Total		114	3306	3420
(variable)		(I <sub>2</sub> )	(E <sub>2</sub> )	(K)

### **Calculation of interrater reliability with Cohens Kappa**

The following formula was used to calculate Cohen's Kappa:

$$\kappa = \frac{P_0 - P_E}{1 - P_E}$$

applies here:

$$P_0 = \frac{a+d}{K} = \frac{45+3197}{3420} \approx 0,948$$

$$P_E = \frac{I1*I2+E1*E2}{K^2} = \frac{154*114+3266*3306}{(3420)^2} \approx 0,924$$

This results in the following value for the interrater reliability:

$$\kappa = \frac{0,948 - 0,924}{1 - 0,924} \approx 0,315$$

According to the Cochrane Handbook Version 5.1 (Higgins and Green 2011), an interrater reliability is only considered sufficient above 0.4 (values of 0.4-0.59 indicate a fair agreement, values between 0.6 and 0.7 indicate a good agreement, and values >0.75 indicate a very good agreement. There are several reasons for the rather poor value here. Cochrane calculates the interrater reliability from the decision areas 'Include', 'Exclude', 'Undefined'. Here, the category "Undefined" was not included in the calculation, since in any case the reviewer had to decide for one of the two other categories. This methodological procedure already explains a smaller agreement.

After unblinding, it became apparent that incorrect decisions were sometimes made due to mistakes in comprehension or translation errors. The studies concerned could then be assigned very quickly by consensus.

The delimitation of whether SMEs were considered was also challenging. For example, an enterprise was described as SME in abstract, but since the number of subjects under examination significantly exceeded 250, it could be assumed that it was not a SME according to the EU definition. Some of these studies were thus categorized differently. It was also difficult to delineate whether they were indeed enterprises or rather, for example, governmental or NGO organizations. In the healthcare sector in particular, it was often not possible to clearly ascertain

whether facilities in other countries were governmental or privately organized and whether these enterprises were companies in the traditional meaning of the term, where revenue is also generated (see definition of population).

A further challenge was to decide whether the examined topic could actually be assigned to the field of occupational mental stress (e.g. studies of mental illness in the context of work). Even if studies dealt with economic topics, but topics such as stress were mentioned in the abstract, an assignment was often challenging.

Full-text screening was performed by two independent reviewers. Despite all efforts, full texts were not available for six of the studies assigned to full-text screening, hence these studies were excluded. For another five studies, the two reviewers were unable to make a conclusive assignment; these were discussed with a third reviewer and subsequently categorized by consensus. A total of 71 full texts were excluded. Reasons for exclusion were wrong language (not English or German), the absence of peer reviewing, book chapter or dissertation or inclusion criteria not met, a listing of excluded studies with the respective reason for exclusion can be found in Table 17 (Annex). A total of 45 studies were included in full text analysis. An overview of all included studies is shown in Table 11 (Annex), which has already been published and adopted without amendment (Schreibauer et al. 2020).

### **3.3 Characteristics of the studies included**

Table 11 in the Annex shows a concise presentation of the results of full-text analysis and identified study characteristics, the table was published previously and adopted unaltered (Schreibauer et al. 2020). The following section will describe and explain the information described in the publication in more detail and by an extended quality rating of the studies included.

#### **3.3.1 Countries**

The vast majority of included studies were carried out in the European Union (n=22), see Table 11 (Annex). Four studies refer to the United Kingdom (Lai et al. 2015; Lewis et al. 2017; Magola et al. 2018; Myers and Myers 2004), four to Italy (Estévez-Mujica and Quintane 2018; Magnavita 2015; Magnavita 2018; Setti

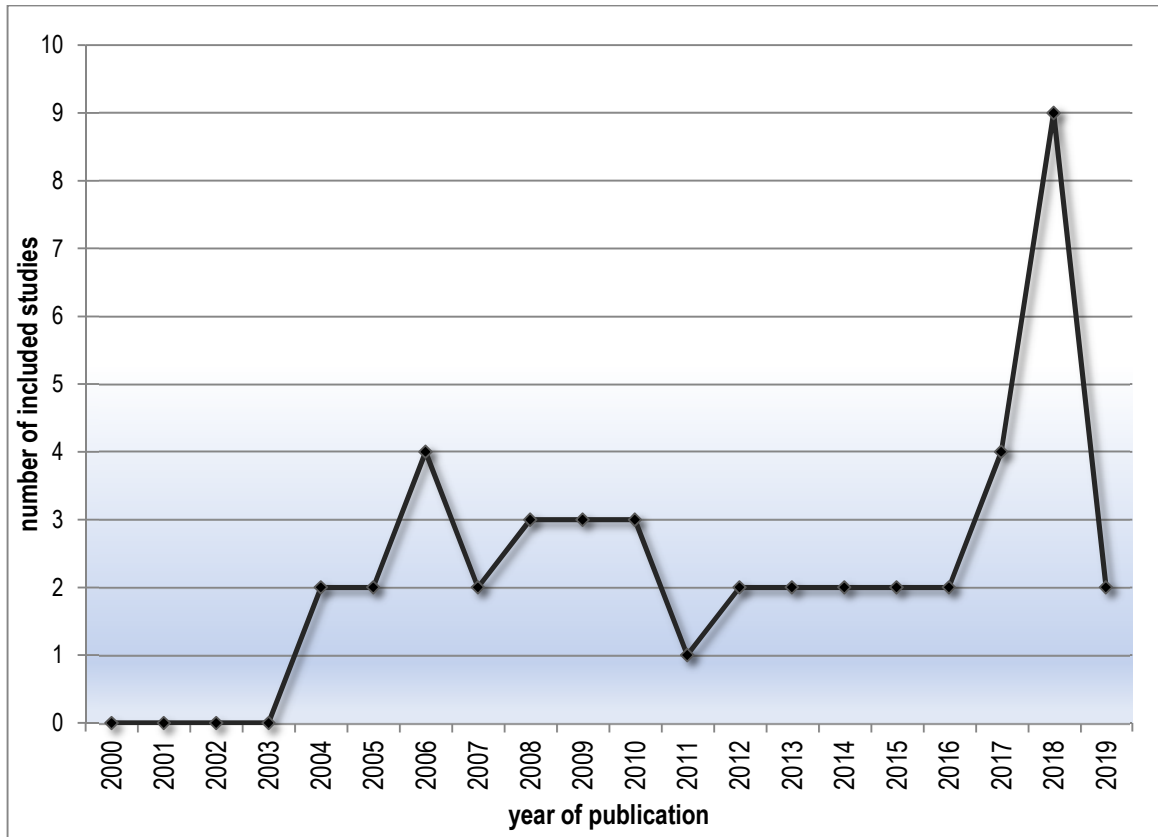
et al. 2018), two studies each related to Denmark (Agervold et al. 2004; Berthelsen et al. 2008), France (Encrenaz et al. 2019; Fernet et al. 2016), and four to Germany (Hildenbrand et al. 2018; Sonnentag and Spychala 2012; Voss and Drexler 2019). There is one study each from Spain (Díaz-Chao et al. 2017), Ireland (Sommovigo et al. 2018) and Greek (Koskina and Keithley 2010). Rau et al. (2008) investigated a sample in the Tri-border corner of Germany, Czech Republic and Poland; Sommovigo et al. (2018) researched SMEs in Ireland and Italy. Three studies examined populations in other non-EU but European countries: Kottwitz et al. (2014) in Switzerland, Mihic et al. (2015) in Serbia and Torp (2008) in Norway.

Another focus was on the Asian countries with their developing economy (n=12): Japan (Ikeda et al. 2009; Nakata et al. 2006; Nakata et al. 2007; Nakata 2012), Taiwan (Wang et al. 2009; Yeh et al. 2018), South Korea (Rhee 2010), Thailand (Sawang 2010), Malaysia (Rahman et al. 2014), Pakistan (Saleem et al. 2016) and India (Rastogi et al. 2018). Rhee (2010) examined a sample of South Korea and Japan, Isahak et al. (2017) used transnational data from Malaysia, Indonesia, Thailand and Vietnam. Three of the studies made in Japan used data from the same survey from August to December 2002 but examined different psychosocial factors and outcomes (Ikeda et al. 2009; Nakata et al. 2006; Nakata et al. 2007).

Other studies were conducted in Australia (Cocker et al. 2013; Villanueva and Djurkovic 2009), in United States (Bennett et al. 2006; Casteel et al. 2008) and in New Zealand (Gardner and Hini 2006). No studies from South American countries and the African Continent could be included.

### **3.3.2 Year of publication**

No study from the years 2000-2003 met the inclusion criteria, so the earliest included study was published in 2004 (see Figure 3 ). In the following years, one to four studies were published, with a maximum value of nine studies in 2018 (c.f. Schreibauer et al. 2020).



**Figure 3** Year of publication of included studies

### 3.3.3 Sample Characteristics

The number of participants of included studies varied between 7 and 23000 (e.g. surveys of employees in SMEs), showing heterogenous samples. Five studies examined SME-managers/enterprise owners only (Cocker et al. 2013; Fernet et al. 2016; Godin et al. 2017; Mihic et al. 2015; Rau et al. 2008). Some studies used data from nationwide surveys (Díaz-Chao et al. 2017; Encrenaz et al. 2019; Ikeda et al. 2009; Lai et al. 2015; Nakata et al. 2006; Nakata et al. 2007; Nakata 2012; Yeh et al. 2018), by contrast other studies evaluated only one single enterprise (Agervold et al. 2004; Koskina and Keithley 2010; Kottwitz et al. 2014; Magnavita 2018).

### 3.3.4 Study Designs, Objectives and Quality rating

No RCTs and no systematic reviews as high-quality research designs were identified. However, three intervention studies were detected (Casteel et al. 2008;

Magnavita 2018; Torp 2008). Casteel et al. (2008) investigated retailer robberies, a restricted subject area of occupational stress, represented in the factor “emotional demands”. The sample was location-limited (Los Angeles) and therefore not representative, but the study design included a control group (control businesses were matched to enrolled businesses by community crime and business type). The purpose of the study was to reduce robberies at small retailers and thus to reduce the presumed number of fatalities, e.g. by training staff and optimizing the layout of the sales premises (e.g. better lighting, better visibility from the street). The stress resp. the psychological consequences of robberies for the employees and/or owners have not been investigated, although other studies have identified robberies and thefts as a stressor for reduced employee well-being (Setti et al. 2018). The study of Torp (2008) with a quasi-experimental study-design offered a control group but without randomization. It was the only study that focused on risk assessments and their effects on corporate culture and employee’s health. Magnavita (2018) used a cost-effective participatory model intervention to reduce psychosocial risks at an Italian SME. During regular health examinations, which were emphasized as useful to identify problems in the workplace climate and work organizations, perceived occupational stress was assessed by using the Effort/Reward Imbalance questionnaire and an improvement in psychological wellbeing was assessed by the Goldberg Anxiety/Depression scale.

Two qualitative studies were included. One study (Koskina and Keithley 2010) used semi-structured interviews with customer service representatives, interviews with different levels of management and limited non-participant observations to investigate emotion management of employees of a SME in the Greek telecommunications sector. The study dealt with psychosocial resources compared to most other studies that focused on psychosocial risks. However, as a single-case study, it had some risk of bias. Nominal group discussions were used by Magola et al. (2018) to evaluate challenges faced by novice community pharmacists at transition to self-employment.

The majority of included studies were of cross-sectional design (n=37), most of which were rated as valuable and of good or medium quality (see Annex

Table 12). In some studies, reporting of methods was incomplete (e.g. Bennett et al. 2006; Berthelsen et al. 2008; Gardner and Hini 2006) or there were questions to internal reliability, (e.g. Godin et al. 2017; Mihic et al. 2015). Some examined very specific questions in and around psychosocial stress e.g. bullying or robberies (Setti et al. 2018; Sommovigo et al. 2018) or small, non-representative samples e.g. IT-workers of a small enterprise (Estévez-Mujica and Quintane 2018).

Three studies were unsystematic reviews that did not collect data (Allan and Lawless 2005; Chuang 2006; Cooper 2005). Due to their study design these three articles had a high risk of bias and low internal quality, but they show the interest of researchers in changing work characteristics, during the first years of the century, in the specific environment of SMEs. Cooper (2000) analyzed the changing world of work and its impact on employees and their families at the beginning of the 20th century. He focused on new forms of work, affecting most of all SMEs, self-employed and outsourced workers in virtual organization. Allan and Lawless (2005) investigated online learning as a new form of learning in enterprises and the challenges especially in SMEs. Chuang (2006) discussed work-related and family-related stress constructs as significant problems of SMEs.

Nearly half of the included studies did not report the year or date of data collection, making it infeasible to verify the currency of the datasets at the time of publication (see Annex, Table 11).

### **3.3.5 Studies Comparing SMEs and Larger Enterprises**

Four studies investigated the differences of job stress in SMEs compared to job stress in large firms (Encrenaz et al. 2019; Lai et al. 2015; Tsai et al. 2007; Yeh et al. 2018). Whereas Tsai et al. (2007) found higher levels of work pressure and better scores of “attitudes to[ward] managers” (p.1801) in SMEs. After adjusting for covariates, Lai et al. (2015) found no impact of company size on “overall job stress” in a European sample (UK). Yeh et al. (2018) reported lowest job control, lower career prospect and higher job insecurity in a Taiwanese sample of SMEs compared to large enterprises and the public sector. Encrenaz et al. (2019) investigated the influence of company size on mental health by measuring

“anxious/depressive episodes”, considering the mediating role of perceived working conditions (Encrenaz et al. 2019). The authors reported, that in terms of frequency of anxious/depressive episodes, the only significant difference was between the sample of microenterprises and the other enterprise sizes (Encrenaz et al. 2019). Comparison between microenterprises (<10 employees) and other firm-sizes showed differences in perceived working conditions. In micro enterprises the frequency of anxious/depressive episodes was lower, the psychological demand score was lower, whereas decision latitude and social support scores were higher. There was a significant indirect effect of company size on mental health through perceived working conditions, with a larger effect for psychological demands (Encrenaz et al. 2019). Perceived poor social support and increased mental demands were found to enhance risk of anxious/depressive episodes for employees in microenterprises (Encrenaz et al. 2019).

#### **3.4 Dimensions of work-related psychological stress**

Table 6 (previously published: Schreibauer et al. (2020)) shows an overview of investigated work characteristics according to the GDA-recommendations. As seen there, many studies focused on the dimensions ‘work content and task’ (n=33) and ‘organization of work’ (n=31), followed by ‘social relations’ (n=30). The dimensions ‘new forms of work’ (n=9) and ‘working environment’ (n=7) have received little attention. Only one study considered all five work characteristics of the GDA-table to assess work quality in SMEs (Encrenaz et al. 2019) compared to other studies that examined a very limited selection of stress factors (e.g. Sawang (2010)).



**Table 6 Allocation to Dimensions of Psychosocial Factors and Single Work Characteristics\* (previously published: Schreibauer et al. (2020))**

Annotation:

\* The classification of the table corresponds to the table in Beck et al. (2014, p.17-19).

\*\* In the original version (Schreibauer et al. 2020) there was an incorrect number (n=8), which is hereby corrected.

Dimensions and work characteristics (number of studies)	Work content and task (n=33)							Organization of work (n=31)			Social relations (n=26)		Working conditions environment (n=7)				New forms of work (n=9**)
	Completeness of task	Freedom of action	Variability	Information/ supply of information	Responsibility	Qualification	Emotional demands	Work time	Work process	Communication/ Cooperation	Colleagues	Managers	Physicochemical factors	Physical factors	Workplace and information structure	Work equipment	
Author, year	0	16	3	3	11	7	9	16	21	13	17	19	4	4	1	2	9*
(Myers and Myers 2004)					X	X		X								X	
(Agervold et al. 2004)							X										
(Cooper et al. 2000)																	X
(Allan and Lawless 2005)					X				X								
(Bennett et al. 2006)	X							X					X				
(Gardner and Hini 2006)			X	X	X	X	X	X	X	X	X	X					
(Nakata et al. 2006)	X							X	X	X	X	X					
(Chuang 2006)		X		X				X	X								
(Nakata et al. 2007)	X							X	X	X	X						
(Tsai et al. 2007)	X				X			X	X		X						
(Berthelsen et al. 2008)									X	X							
(Casteel et al. 2008)						X											
(Rau et al. 2008)	X			X				X	X								
(Torp 2008)	X			X							X	X					
(Ikeda et al. 2009)	X							X	X	X	X	X					
(Villanueva and Djurkovic 2009)												X					
(Koskina and Keithley 2010)						X											
(Wang et al. 2009)	X							X	X	X	X						
(Rhee 2010)	X							X	X		X	X	X	X			
(Sawang 2010)											X						

(Baillien et al. 2011)				X										
(Sonnentag and Spsychala 2012)	X	X			X	X							X	
(Nakata 2012)					X									
(Cocker et al. 2013)			X		X		X	X						
(Kottwitz et al. 2014)						X	X	X						
(Lai et al. 2015)	X							X						X
(Rahman et al. 2014)			X	X	X	X	X	X	X					
(Mihic et al. 2015)	X		X		X		X	X						
(Magnavita 2015)				X										
(Saleem et al. 2016)	X		X		X	X		X						X
(Fernet et al. 2016)			X				X	X						
(Godin et al. 2017)					X	X	X							X
(Lewis et al. 2017)							X							
(Isahak et al. 2017)					X	X			X	X				X
(Díaz-Chao et al. 2017)	X	X		X	X	X	X	X	X	X	X			X
(Hildenbrand et al. 2018)								X						
(Magnavita 2018)					X	X		X						X
(Sommovigo et al. 2018)				X										
(Setti et al. 2018)				X		X								
(Magola et al. 2018)			X	X			X	X						
(Yeh et al. 2018)	X				X									X
(Rastogi et al. 2018)			X			X	X							
(Estévez-Mujica and Quintane 2018)			X			X	X	X						
(Encrenaz et al. 2019)	X	X				X		X						
(Voss and Drexler 2019)														X

Subsequently, the studies allocated to the five dimensions and the single work characteristics will be presented in more detail:

### 3.4.1 Work content and task

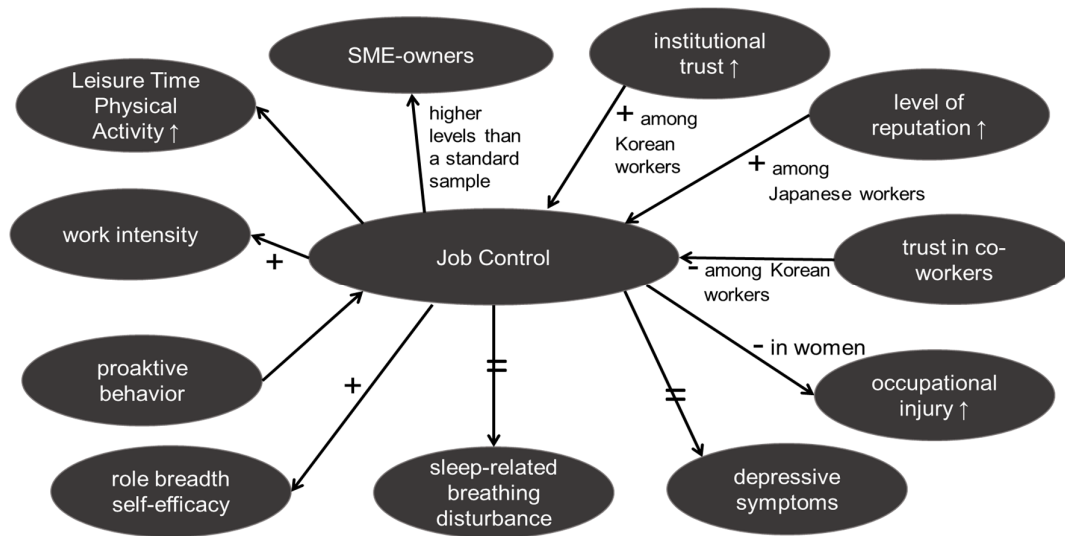
No study assessed 'completeness of task', whereas a high number of studies (n=16) investigated 'freedom of action' (see Table 7). Most of these studies assessed 'job/work control' (Bennett et al. 2006; Ikeda et al. 2009; Nakata et al. 2006; Nakata et al. 2007; Rau et al. 2008; Rhee 2010; Torp 2008; Sonnentag and Spsychala 2012) or 'job autonomy' (Díaz-Chao et al. 2017; Lai et al. 2015; Saleem et al. 2016; Tsai et al. 2007).

**Table 7** Investigated factors and correlations in the context of "freedom of action"

<b>Study</b>	<b>Investigated factor</b>	<b>Investigation results/outcomes</b>
Bennett et al. 2006	Job control	Reporting job control was significantly associated with higher "Leisure Time Physical Activity" (LTPA), but had not a significant interaction with race or ethnicity ( $p = .04$ ).
Nakata et al. 2006	Job control	Low job control in women was significantly associated with increased occupational injury.
Nakata et al. 2007	Job control	Job control was not significantly related to sleep-related breathing disturbance.
Tsai et al. 2007	Job autonomy	Manual SME- food workers had rather less autonomy than those in the most closely comparable occupational category (plant and machine operatives) identified in the Workplace Employment Relations Study (WERS). Two, from authors defined high educated occupational groups (information and communication technology, creative and media) in SMEs, had more autonomy than the group of "professional workers" of all businesses in WERS.
Rau et al. 2008	Job control	SME-owners had higher job control levels than a standard sample. Work intensity was positively related to job control.
Torp 2008	Decision authority (Job control)	A Health and Safety Management Training Program had no effect on decision authority.
Ikeda et al. 2009	Job control	Job control was not significantly related to depressive symptoms
Wang et al. 2009	Decision latitude	Fatigue was negatively related to decision latitude.
Rhee 2010	Work control	For Japanese workers, only trust in co-workers had an influence on the work stressor work control, but for Korean workers, it was influenced by reputation, trust in career development, trust in working rules, and trust in employer. Among Japanese workers, trust in co-workers was positively related to work control. Only in Korean workers, the level of work control was high when institutional trust, such as trust in career development and working rules, and trust in employer were high, while their level

		of reputation was high when the level of work control was low.
Sonnentag and Spychala 2012	Job control	Job control was positively related to role breadth self-efficacy. Job control had an indirect and also a direct positive association with proactive behavior.
Lai et al. 2015	Job autonomy	Poor job autonomy was a more important stressor in large enterprises compared to SMEs
Mihic et al. 2015	Flexible working hours, level of responsibility	High levels of responsibility and flexible working hours were perceived as positive stress from family business owners
Saleem et al. 2016	Job autonomy	Work autonomy was not a moderating factor for work exhaustion leading to turnover among employees of a Pakistani bus company. A high level of perceived work overload was associated with a high level of work exhaustion; the analysis likewise showed a positive relationship between work-family conflict and work exhaustion, i.e., when the level of work-family conflict is high, the employee was exhausted by the work at the workplace.
Díaz-Chao et al. 2017	Job autonomy	Employees in SMEs had higher satisfaction with job autonomy compared to employees in large enterprises.

The correlations with different outcomes of the frequently reported psychosocial factor 'job control' is summarized in Figure 4, details for all psychosocial factors of 'freedom of action' are given in Table 7 shows the heterogeneity of studies addressing 'job control'. Correlations to diseases and accidents as well as to behavior and also to other work factors were investigated.



**Figure 4** Data extraction from included studies: Relationships of job control to other factors and outcomes

**Legend:** → association; + positive relation; - negative relation; ↑ increase; = no significant correlation (for more Details, see Table 7)

‘Variability’ was mentioned in three studies. One study surveyed ‘Variability’ as an item of the decision latitude dimension, without reporting an outcome-related analysis (Encrenaz et al. 2019), another (Chuang 2006) identified excessive task complexity as risk factor for higher stress levels among employees in small businesses. The third paper (Díaz-Chao et al. 2017) used monotony as an item in the work organization and workplace relationships dimension of a questionnaire, without reporting a related outcome specifically for this item.

Three studies assessed ‘Information/ supply of information’. One paper (Gardner and Hini 2006) focused on ability to keep up with new technologies/knowledge, but without focusing exactly on information. Another paper examined ‘situational constraints’ (‘situations characterized by malfunctioning, missing, incomplete, or outdated equipment, tools, or information’) as a linking mechanism for ‘proactive work behavior’ and ‘role breadth self-efficacy’ (Sonnentag and Spychala 2012). Email communication patterns were the subject of the third study (Estévez-Mujica and Quintane 2018), which looked at email communication as a job demand or job resource related to burnout, with ‘information overload’ as a contributing

factor. Volume-related e-mail communication was a poor predictor of increased risk of burnout.

The factor 'responsibility' was investigated by (n=11) studies, but only three of them assessed directly the factor 'responsibility' in the work context (Cocker et al. 2013; Gardner and Hini 2006; Mihic et al. 2015). Studies that dealt with 'decision-making', 'job autonomy', and 'role ambiguity' were also classified here, since a higher degree of freedom often goes hand in hand with higher responsibility. The summary of the studies assigned to 'responsibility' is shown in Table 8.

**Table 8** *Studies assessing responsibility*

<b>Study</b>	<b>Investigated factor</b>	<b>Investigation result / Outcome</b>
Gardner and Hini 2006	Responsibility for animals' lives	Responsibility of animals' lives was more of concern in small animal veterinarian practices compared to large animal practices and mixed practices.
Chuang 2006	task and role overload	Chuang hypothesized that employees in small businesses often have numerous tasks to complete and are responsible for a variety of tasks, which can lead to stress from task and role overload. He also found that understaffing also leads to employees being overloaded with both their tasks and roles, which also increases perceived demands and stress levels. The increased stress levels could lead to higher levels of insecurity.
Rau et al. 2008	Decision latitude of business owners	A significant positive correlation was identified between decision latitude and work intensity among SME entrepreneurs.
Torp 2008	Decision authority	Little difference in decision authority was observed between an intervention group and a control group after a Health and Safety intervention.
Cocker et al. 2013	Responsibility for business	The responsibility that managers/owners of SMEs felt for the day-to-day operations and supervision of the work was described as an influencing factor on attendance, but responsibility was not measured as a separate variable.
Rahman et al. 2014	Role in organization	Role in Organization was a significant predictor and contributed to 14.3% variance in the occupational stress score.
Mihic et al. 2015	Level of responsibility	A high level of responsibility was perceived by SME owners as "positive" stress and was not an

		important factor of giving up on starting a business. However, high levels of responsibility for achieving results was identified as one of the most important stressors. A high correlation was identified between high responsibility levels and the number of family-member employees. The largest percentage of owners from companies with more than 10 family members perceived a high level of responsibility as a factor inducing stress.
(Saleem et al. 2016)	Job Autonomy (containing questions to responsibilities)	Responsibility was only assessed as an item for work exhaustion. The results for work exhaustion can be found in Table 7.
Fernet et al. 2016)	Role stressors	Role stressors were assessed as items of the variable "job stressors". There was no data analysis for role stressors only.
Magola et al. 2018)	'Decision making' and 'being in charge and accountable'	Novice community pharmacists identified 'decision making' and 'being in charge and accountable' as the most important challenges.
Rastogi et al. 2018)	Job complexity	Contrary to expectations, disengagement was positively associated with job complexity. Resilience did not moderate the relationship between job complexity and disengagement.

The factor 'qualification' was investigated by seven studies. One study (Myers and Myers 2004) assessed only a quantitative aspect of 'qualification' ("length of time since qualification") another study (Allan and Lawless 2005) described the challenges of online collaborative learning in SMEs. Veterinarians reported the stressors 'level of technical skills', 'ability to keep up with knowledge' and 'ability to keep up with technology' as most important of all skill and expertise stressors (Gardner and Hini 2006). In food firms and non-manual employees high 'extent of and satisfaction with training' was reported (Tsai et al. 2007). One paper investigated the influence of occupational stress on 'training needs development' (Rahman et al. 2014). SMEs had a higher explanatory coefficient for 'satisfaction with training' related to 'job quality' compared to large enterprises (Díaz-Chao et al. 2017). Another study described the training program of novice community pharmacists (NCPs) and figured out that NCPs lacked the skills and confidence to effectively manage 'colleagues' (Magola et al. 2018). Contrary to expectations, positive relationship between 'job complexity' and 'disengagement' was explained by Rastogi et al. (2018) with a possible overstraining by the job due to

a lack of know-how and a resulting emotional withdrawal that led to the job being perceived as a negative challenge (Rastogi et al. 2018).

'Emotional demands' were considered by nine studies. Four out of ten most stressful factors dentists reported (Myers and Myers 2004) were linkable to 'emotional demands' ('coping with difficult, uncooperative patients', 'a patient having a medical emergency in the surgery', 'dissatisfied patients', 'treating extremely nervous patients'). In a veterinary study (Allan and Lawless 2005) the factors 'client expectations', 'communication with clients' and 'unexpected outcomes' were assessed. 'Bullying' at the workplace in context of organizational factors was investigated by two studies (Agervold et al. 2004; Baillien et al. 2011), 'workplace violence' was the subject of three studies (Casteel et al. 2008; Setti et al. 2018; Sommovigo et al. 2018). Qualitative methods were used to investigate the 'emotion management' of call center employees (Koskina and Keithley 2010), focusing on working conditions that contribute to positive emotions in the workplace.

#### **3.4.2 Organization of work**

Multiple studies investigated aspects related to 'organization of work', mostly looking at 'work time' (n=16) followed by 'work process' (n=20), and 'communication/cooperation' (n=13). Most studies allocated to 'work time' assessed 'hours worked', 'shift work' or 'work time'. 'Quantitative workload' was the most assessed factor in the work process dimension. However, the correlations of these factors with the outcome were rarely reported, as factors were mostly assessed only as one of many scales in occupational stress questionnaires. Within 'communication/collaboration', the ability to communicate or collaborate (in terms of social support) has often been assessed (Berthelsen et al. 2008; Magola et al. 2018), but there were only few studies that addressed the effects of quantity or quality of communication or communication methods (Estévez-Mujica and Quintane 2018).

#### **3.4.3 Social relations**

Studies that looked at 'social relationships with managers' (n=19) or 'with colleagues' (n=17) were roughly equally distributed in terms of numbers. The



work pattern 'social relations' in general was measured by three studies (Cocker et al. 2013; Kottwitz et al. 2014; Mihic et al. 2015) and one study referred to Siegrist's Effort-Reward-Imbalance model (Magnavita 2018), in which the ERI questionnaire was used to assess occupational stress with items on 'esteem', a type of interpersonal interaction. 'Social support in the workplace' of dentists (Berthelsen et al. 2008) was assessed and 'social contact', 'social climate' and 'management style' (Agervold et al. 2004) were measured. 'Intragroup conflict' and 'social support' were assessed by the three Japanese studies (Ikeda et al. 2009; Nakata et al. 2006; Nakata et al. 2007).

#### **3.4.4 Working environment**

Physiochemical factors were assessed by three studies (Díaz-Chao et al. 2017; Isahak et al. 2017; Rhee 2010). 'Lighting' was measured by two studies 'inadequate light' by Isahak et al. (2017) and 'level of lighting conditions' by Díaz-Chao et al. (2017) whereas 'climate' ('discomfort thermal condition') was measured only by Isahak et al. (2017). Rhee (2010) alone assessed the variables 'hazardous work condition' and 'handling of hazardous materials'.

Three studies dealt with the physical factors 'physical occupational activity' (Bennett et al. 2006), 'poor physical working conditions' (Rahman et al. 2014) and 'heavy physical work', 'repetitive activities', 'forced postures and risks of falls' (Isahak et al. 2017). 'Workplace and information structure' was only studied by Díaz-Chao et al. (2017) assessing 'workspace'. The factor 'work equipment' was studied by Sonnentag and Spsychala (2012) looking at 'situational constraints' associated with 'malfunctioning, missing, incomplete, or outdated equipment, tools, or information' whereas Myers and Myers (2004) dealt with 'staff and technical problems, e.g. equipment breakdown and defective materials'.

#### **3.4.5 New forms of work**

Nine studies considered 'new forms of work'. The factor 'job insecurity' was assessed by five studies (Díaz-Chao et al. 2017; Isahak et al. 2017; Lai et al. 2015; Magnavita 2015; Yeh et al. 2018) whereas 'flexible work hours' and 'work-life-balance' were taken into account by three studies (Díaz-Chao et al. 2017; Godin et al. 2017; Saleem et al. 2016). Cooper (2005) addressed in his theoretical

exploration several aspects related to “new forms of work”, such as “free-lancers”, “flexible working hours”, and “work-family-conflicts” (Cooper 2005). The work-home interference of entrepreneurs was included in the study of Godin et al. (2017). Only Voss and Drexler (2019) focused in their recently published study on accessibility and expected availability of workers due to new communication methods (Voss and Drexler 2019).

### **3.5 Economic sectors**

Table 9 illustrates the proportional distribution of studies among sectors.

Many studies reported no economic sector (n=8) or used data from surveys within several industrial sectors (n=7), some studies described their investigated enterprises as service enterprises without specifying a more detailed definition (n=2). Most studies examined enterprises in the manufacturing sector (n=17). Section G “Wholesale and retail trade; repair of motor vehicles and motorcycles” was the second most frequently investigated sector in this review (n=5) followed by the sections G., I., J. and Q. (n=4) and the Section M “Professional, scientific and technical activities” (n=3) Few studies investigated enterprises in the sections A., D., N. and R.

The sections B., D., E., K, L., O., P. and U are more typical for large enterprises (e.g. electricity suppliers, oil companies, insurance companies) or public and civil-service institutions (hospitals, schools, public offices) and no studies examined companies from these sectors. Looking more closely at the healthcare sector, we found studies for dentists, pharmacists, and veterinarians, but no study for general practitioners (GPs).

**Table 9** Allocation of the studies to economic sectors of the International Standard Industrial Classification of All Economic Activities (ISIC)\*

Addendum:

\*Reference: DESA (2008). Table was adapted from Schreibauer et al. (2020), supplementary table S3.

Industrial Section	n	Reference
A. Agriculture, forestry and fishing	2	(Díaz-Chao et al. 2017; Rau et al. 2008)
B. Mining and quarrying	0	---
C. Manufacturing	18	(Agervold et al. 2004; Bennett et al. 2006; Díaz-Chao et al. 2017; Hildenbrand et al. 2018; Ikeda et al. 2009; Isahak et al. 2017; Lai et al. 2015; Mihic et al. 2015; Nakata et al. 2006; Nakata et al. 2007; Nakata 2012; Rastogi et al. 2018; Rhee 2010; Sawang 2010; Sonnentag and Spychala 2012; Tsai et al. 2007; Villanueva and Djurkovic 2009; Yeh et al. 2018)
D. Electricity, gas, steam and air conditioning supply	1	(Yeh et al. 2018)
E. Water supply; sewerage, waste management and remediation activities	0	---
F. Construction	3	(Díaz-Chao et al. 2017; Magnavita 2015; Yeh et al. 2018)
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	5	(Casteel et al. 2008; Magnavita 2015; Setti et al. 2018; Sommovigo et al. 2018; Torp 2008)
H. Transportation and storage	0	---
I. Accommodation and food service activities	4	(Agervold et al. 2004; Godin et al. 2017; Nakata et al. 2007; Setti et al. 2018)
J. Information and communication	4	(Koskina and Keithley 2010; Kottwitz et al. 2014; Rau et al. 2008; Tsai et al. 2007)
K. Financial and insurance activities	0	---
L. Real estate activities	0	---
M. Professional, scientific and technical activities	3	(Estévez-Mujica and Quintane 2018; Gardner and Hini 2006; Villanueva and Djurkovic 2009)

N. Administrative and support service activities	2	(Magnavita 2018; Villanueva and Djurkovic 2009)
O. Public administration and defense; compulsory social security	0	---
P. Education	0	---
Q. Human health and social work activities	4	(Berthelsen et al. 2008; Magnavita 2015; Magola et al. 2018; Myers and Myers 2004)
R. Arts, entertainment and recreation	1	(Tsai et al. 2007)
S. Other service activities	3	(Mihic et al. 2015; Saleem et al. 2016; Villanueva and Djurkovic 2009)
T. Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0	---
U. Activities of extraterritorial organizations and bodies	0	---
Service (not specified from author)	2	(Díaz-Chao et al. 2017; Yeh et al. 2018)
Several sectors reported (i.e. nationwide surveys)	7	(Cocker et al. 2013; Godin et al. 2017; Lai et al. 2015; Lewis et al. 2017; Saleem et al. 2016; Voss and Drexler 2019; Yeh et al. 2018)
No sector reported	8	(Allan and Lawless 2005; Baillien et al. 2011; Chuang 2006; Cooper 2005; Encrenaz et al. 2019; Fernet et al. 2016; Rahman et al. 2014; Wang et al. 2009)

### 3.6 Outcomes and measuring instruments

Table 10 summarizes the outcomes examined in the included studies and the measuring instruments the authors used for data collection. The outcomes were assigned either to the category positive outcomes/resources or to negative outcome/risk. Overall, researchers seemed to focus more on risks, whereas resources were studied less frequently. For social relations outcomes, study authors assessed more resources than risks, whereas outcomes related to general stress and mental health were more often identified as risks. Business outcomes were assessed in equal proportions as risks or resources.

The most commonly investigated outcomes were risks and resources of mental health (n=19), followed by general (work-related) stress outcomes (n=15) and business-related outcomes (n= 14). Business-related outcomes were more likely to be assessed in the more recent studies (most of which were published from 2013 onward). Outcomes to somatic health have been poorly studied (n=4 for cardiovascular health, n=1 for musculoskeletal system).

With exception of 'blood pressure' and 'observed rate of violent crime' the outcomes were self-reported, mostly assessed via questionnaires. Most studies used established questionnaires or items from previously used questionnaires, however, there were also some studies that used self-developed questions and not all reported validation of their measurement instruments

**Table 10** Summary and classification of outcomes<sup>†</sup>

**Annotations:** †Adapted classification according to Rothe et al. (2017), table content corresponds to table 2 in Schreiberbauer et al. (2020).

\*non-self-reported measures

Classification	Positive outcomes/resources		Negative outcomes/risks			
	outcome	Reference	Applied measurement instrument(s)	outcome	Reference	Applied measurement instrument(s)
General (work-related) stress outcomes				<b>Work stress</b>	Myers and Myers (2004)	The Work Stress Inventory for Dentist (WSID)
					Gardner and Hini (2006)	Self-developed items
				<b>Work-related stress</b>	Magnavita (2018)	ERI questionnaire, short and validated Italian version
					Voss and Drexler (2019)	Self-developed items
				<b>Stress reaction</b>	Rhee (2010)	Self-developed items
				<b>Workload</b>	Setti et al. (2018)	Areas of Work life Survey (Subscale)
				<b>Work exhaustion</b>	Rastogi et al. (2018)	OLBI questionnaire (4 items from exhaustion subscale)
				Saleem et al. (2016)	Pre-used questionnaire	
			<b>Employees' experience of overall job stress</b>	Lai et al. (2015)	Constructed scale of WERS 2011	
			<b>Level of stressful</b>	Gardner and Hini (2006)	Self-developed items	

				<b>situations at work</b>		
				<b>Stressful work-related conditions</b>	Myers and Myers (2004)	Work Stress Inventory for Dentists (WSID), adapted
				<b>Perceived stress</b>	Myers and Myers (2004) Rhee (2010)	Perceived Stress Scale (PSS) Self-developed item
				<b>Personal stress</b>	Gardner and Hini (2006)	Self-developed items
				<b>Psychological stress</b>	Agervold et al. (2004)	The Psychosocial Work environment and Stress Questionnaire (PWSQ)
				<b>Psychological distress</b>	Cocker et al. (2013) Wang et al. (2009)	Kessler (K10) Screening Scale for Psychological Distress The Taiwanese Depression Questionnaire (TDQ)
				<b>Psychological pressure</b>	Mihic et al. (2015)	Self-developed items
				<b>Job complexity</b>	Rastogi et al. (2018)	Pre-used items
				<b>Work-home interference</b>		Kelloway's work-family conflict questionnaire
<b>Health</b>	<b>Health</b>	Myers and Myers (2004)	GHQ-12; health-related behaviors questionnaire; minor ailments and symptoms checklist (unspecified)	<b>Self-reported sick-leave</b>	Agervold et al. (2004)	The Psychosocial Work environment and Stress Questionnaire (PWSQ)
	<b>Self-rated health (SRH)</b>	Nakata (2012) Godin et al. (2017)	Self-developed item Self-developed item	<b>Occupational injury</b>	Nakata et al. (2006)	Self-developed single item
<b>Well-being</b>	<b>Quality of life</b>	Isahak et al. (2017)	The WHO quality of life assessment instrument (WHOQOL-Bref)	<b>Vital exhaustion</b>	Rau et al. (2008)	Maastricht Questionnaire (MQ)

<b>Factors affecting cardiovascular health</b>	<b>Leisure time physical activity</b>	Bennett et al. (2006)	Modified version of a pre-used semi-quantitative activity questionnaire	<b>Metabolic syndrome component</b>	Magnavita (2015)	Common diagnosis criteria
				<b>Sleep-related breathing disturbance</b>	Nakata et al. (2007)	Pre-used adopted single item
				<b>Increased blood pressure</b>	Rau et al. (2008)	24h-automatically-recorded blood pressure
<b>Mental health</b>	<b>General psychological health</b>	Setti et al. (2018)	General Health Questionnaire (GHQ-12)	<b>Psychosomatic symptoms</b>	Agervold et al. (2004)	The Psychosomatic Work Environment and Stress Questionnaire (PWSQ)
	<b>Emotion management</b>	Koskina and Keithley (2010)	Qualitative methods (semi-structured interviews, non-participant observations)	<b>Fatigue</b>	Wang et al. (2009)	Chinese version of Checklist individual Strength (CIS)
	<b>Mental well-being (absence of anxiety and depression symptoms)</b>	Magnavita (2018)	Goldberg Anxiety and Depression scale (GADS)	<b>Mental fatigue</b>	Agervold et al. (2004)	The Psychosomatic Work Environment and Stress Questionnaire (PWSQ)
	<b>Resilience</b>	Rastogi et al. (2018)	Pre-used items	<b>Burnout</b>	Estévez-Mujica and Quintane (2018); Hildenbrand et al. (2018)	OLBI questionnaire
					Fernet et al. (2016)	French version of the Burnout Measure, Short version (BMS)
	<b>Coping self-efficacy</b>	Setti et al. (2018); Sommovigo et al. (2018)	Seven-item Coping Self-Efficacy scale (CSE-7)	<b>Depressive symptoms</b>	Yeh et al. (2018)	Chinese version of Copenhagen Burnout Inventory (C-BI)
					Ikeda et al. (2009)	Japanese version of the Center for Epidemiologic Studies Depressive Symptoms Scale (CES-D)



	<b>Job satisfaction</b>	Setti et al. (2018) Rhee (2010) Sawang (2010)	Pre-used single item Self-developed item Short version of Minnesota Satisfaction Questionnaire (MSQ)	<b>Depressive Episodes</b>	Encrenaz et al. (2019)	Hospital Anxiety and Depression Scale (HADS-D)
				<b>Depression</b>	Rau et al. (2008)	Hospital Anxiety and Depression Scale (HADS-D)
					Gardner and Hini (2006)	self-developed items
				<b>Anxious Episodes</b>	Encrenaz et al. (2019)	Hospital Anxiety and Depression Scale (HADS-A)
				<b>Anxiety</b>	Rau et al. (2008)	Hospital Anxiety and Depression Scale (HADS-A)
				<b>Sleep disorders</b>	Rau et al. (2008)	Schlaf-Wach-Ergebnisliste [Sleep Wake Experience List] (SWEL)
				<b>Post-traumatic stress symptoms</b>	Setti et al. (2018)	The six-item Impact of Event-Revised scale (IES-R)
				<b>Post-traumatic Stress Disorder (PTSD)</b>	Sommovigo et al. (2018)	The six-item Impact of Event-Revised Scale (IES-R)
				<b>Psychological strain</b>	Sawang (2010)	2 items of the General Health Questionnaire (GHQ)
				<b>Job dissatisfaction</b>	Myers and Myers (2004)	The job dissatisfaction Measure
<b>Musculoskeletal system</b>				<b>Musculoskeletal pain</b>	Torp (2008)	Health Complains Questionnaire
<b>Social relations</b>	<b>Social support Seeking</b>	Setti et al. (2018)	Coping Orientation to Problem Experienced scale (COPE-IV)	<b>Bullying at work</b>	Lewis et al. (2017) Agervold et al. (2004)	Self-developed items 12-item checklist partly based on the Negative Acts Questionnaire (NAQ)

	<b>Sources of Support</b>	Gardner and Hini (2006)	Self-developed scales	<b>Harassment</b>	Baillien et al. (2011)	Negative Acts Questionnaire (NAQ)
	<b>Perceived practical support</b>	Berthelsen et al. (2008)	Self-developed scales	<b>Observed number of violent crimes*</b>	Lewis et al. (2017)	Self-developed items
	<b>Social support</b>	Torp (2008)	Self-developed items		Casteel et al. (2008)	Crimes, identified by L.A. Police departments
		Gardner and Hini (2006)	Self-developed scales			
	<b>Emotional support</b>	Berthelsen et al. (2008)	Self-developed scales			
	<b>Availability of contact with colleagues</b>	Berthelsen et al. (2008)	Self-developed scales			
	<b>Management support</b>	Torp (2008)	Self-developed items			
<b>Business-related outcomes</b>	<b>Success in a family firm</b>	Mihic et al. (2015)	Self-developed items	<b>Presentisms</b>	Cocker et al. (2013)	Self-developed item
	<b>Job quality</b>	Díaz-Chao et al. (2017)	Scales of 2008 and 2011 Quality of life survey (ECVT in Spanish)	<b>Absenteeism</b>	Cocker et al. (2013)	One item from the WHO Health and Work Performance Questionnaires (HPQ)
	<b>Performance enhancement</b>	Rahman et al. (2014)	Unspecified questionnaire (probably self-developed)	<b>Disengagement</b>	Rastogi et al. (2018)	Five items of the OLBI questionnaire
	<b>Promotion opportunities</b>	Tsai et al. (2007)	Self-developed items based on WERS - and other pre-used questions	<b>Productivity loss</b>	Cocker et al. (2013)	Self-developed item
				<b>Turnover intention</b>	Saleem et al. (2016)	Pre-used questionnaire

<b>Job security</b>	Tsai et al. (2007)	Self-developed Questionnaire based on WERS - and other pre-used questions	<b>Intention to leave</b>	Tsai et al. (2007)	Self-developed items based on WERS - and other pre-used questions
<b>Proactive work behavior</b>	Sonnentag and Spychala (2012)	Seven-item scale by Frese et al. (see Reference)	<b>Training needs</b>	Villanueva and Djurkovic (2009)	Five-item scale by Wayne et al. (see Reference)
<b>Importance of work</b>	Godin et al. (2017)	Mow's question on the centrality of work		Rahman et al. (2014)	Unspecified questionnaire (probably self-developed)

## **4 Discussion**

### **4.1 Discussion of results**

This review presents an overview of the current evidence on work-related psychological stress in SMEs. Work-related psychological factors, examined outcomes and economic sectors were considered to categorize current evidence (cf. Schreibauer et al (2020), p.14).

The results indicate that overall research in SMEs tends to be lower than research in larger companies. This is already shown by the fact that overall, despite the very broad search in many databases, only a relatively small number of studies (n=45) on SMEs was included in this review. One reason for this could be that studies in larger companies with few contact persons and access to a large pool of employees are easier for researchers to organize than studies in SMEs, where both the recruitment of companies and communication with many interlocutors is much more time-consuming and cost-intensive. In order to differentiate whether the small number of studies is due to the special topic of psychological stress factors or whether SMEs in particular are actually less researched, the search would have to be carried out again for large companies and the number of studies included compared.

#### ***Study characteristics***

Study characteristics were analyzed and results were summarized in terms of countries of publication, year of publication, quality of available evidence and study samples. Although the objective was to obtain international evidence and the database search results showed a variety of languages in abstracts, the included studies represented only a limited range of countries. Reasons for not including studies from Africa or South America could be the exclusion of keywords related to family businesses in the search string and also the exclusion of publication languages other than German and English. Studies from these countries may have been published in languages that did not meet our inclusion criteria (e.g. French or Spanish or the local language). However, the lack of

studies from South America and Africa fits with the global distribution of publications, where publications from Africa accounted for only about 2% and from South America only about 5% of all publications in 2018 (Schneegans et al. 2021). The use of a European definition for SMEs could be the reason that most of the studies had their origin in Europe as well as the increasing focus of the EU on the development of SMEs as an important economic factor in recent years. Another spotlight was on Asian countries, possibly explained by the fact, that the definition of small and medium-sized enterprises in some Asian countries is similar to that in Europe, and thus many studies met the inclusion criteria. In addition, these countries have progressed further in industrialization compared to African and South American countries and invest more of their GDP in research and development (Schneegans et al. 2021). Furthermore, the Association of Southeast Asian Nations (ASEAN), founded in 1967 and now with ten Member States and as an economic community (ASEAN Economic Community), supported with the "Strategic Action Plan for SME Development 2010-2015 (SAP SME)" the further development of SMEs (ASEAN 2020) which may also have led local researchers to focus more on SMEs.

Although studies from 2000 onwards met our inclusion criteria, the earliest included study was published in 2004, which may be caused by the fact that the definition of SMEs was inconsistent at the beginning of this century and studies from this period did not match the European definition of SMEs (= inclusion criterium of our study). One to four studies were published annually from 2004 onwards, with a peak in 2018 when 9 studies met our inclusion criteria. As described above, SMEs seem to get more into focus of researchers and policy makers in the last years which probably results in a rising number of publications from 2017 onwards (cf. Schreibauer et al. 2020, p. 14).

In the database PubMed, until 2017 studies dealing with occupational stress were tagged with the MeSH terms 'psychological stress' or 'occupational disease'. The MeSH term 'occupational stress' was introduced only in 2018. In the database PsycINFO the Subject Term 'occupational stress' was already indexed in 1973. The new MeSH term in PubMed may have contributed to more studies being found of 2018. Few studies were found in 2019, which is explained by the time of

database search from March to June 2019, when only studies from early 2019 were indexed.

The evaluation of study designs revealed a lack of studies with a high-quality design (e.g., randomized controlled trials). While the majority of studies were of quantitative methods and reported a cross-sectional study design (n=37), few qualitative studies (n=2), narrative reviews (n=3), and intervention studies (n=3) were identified. Most studies focused in their cross-sectional design rather on correlations between work-related psychological factors and various outcomes, not examining causal relationships. Only one study (Magnavita 2018) examined an intervention specifically designed for SMEs to reduce various stressors in the workplace. Another study (Casteel et al. 2008) examined the improvement of premises to prevent robberies and attacks on small retailers and avoid exposure to trauma, thus addressing only a small range of work-related psychological stress factors. However, this study was designed only to reduce robberies. The psychological impact of such robberies on the employees was not part of the study.

These results are in line with a recent study mapping the research of occupational health and safety (Di Fan et al. 2020), which found a dominance of quantitative study designs that focused on correlative relationships.

Most studies were of good to moderate quality, but some had risks of various types of bias. The total quality of evidence can thus be classified as moderate.

The study populations ranged from a few participants (Kottwitz et al. 2014) to national surveys (Díaz-Chao et al. 2017; Encrenaz et al. 2019) and some studies focused only on SME owners/managers (Cocker et al. 2013; Fernet et al. 2016; Godin et al. 2017; Mihic et al. 2015; Rau et al. 2008), showing the heterogeneity of included studies.

### ***Dimensions of work-related psychological stress***

Analysis of the included studies regarding the work-related psychological factors and the categorization of the studies according to the dimensions and their corresponding work characteristics of the GDA recommendations (Beck et al. 2014, p17-19) revealed, that only one study examined all dimensions of work-related psychosocial demands (Díaz-Chao et al. 2017).

Many studies focused on the work patterns 'work content and task' (n=33), 'organization of work' (n=31), and 'social relations' (n=30) whereas 'new forms of work' (n=8) and 'working environment' (n=7) have received little attention.

Within the dimension 'work content and task', there were significant differences in the number of studies that examined the linked work characteristics. Whereas in decreasing order 'freedom of action' (n=16), 'responsibility' (n=11), 'qualification' (n=9) and 'emotional demands' (n=7) received a lot of attention, the work characteristics 'variability' and 'information/supply of information' were only examined by 3 studies each. 'Completeness of task' was not even considered in any study included in this review. The job-demand-control-(JDC-) model of Karasek and Theorell (Karasek 1979; Karasek and Theorell 1999) or rather the extended Job-Demand-Control-Support (JDCS) model of Johnson and Hall (Johnson and Hall 1988), have been known for decades and their dimensions 'job demands' and 'job decision latitude' (job control) have found their way into many study designs and occupational stress questionnaires, which could explain this uneven distribution (cf. Schreibauer et al. (2020)). As can be seen here, the factors 'freedom of action' and 'responsibility', as attributable factors to 'job decision latitude', have been studied most frequently. An analysis of the reported correlations found with the most assessed factor 'job control' (assigned to 'freedom of action') revealed a very heterogeneous landscape. It was examined as a factor influencing health, illness and behavior, as a correlating factor with other work factors, and as a modifier of work in different occupational groups. Therefore, a summary of correlations seemed not to be useful. Only three studies assessed directly the factor 'responsibility' in the work context (Cocker et al. 2013; Gardner and Hini 2006; Mihic et al. 2015), others dealt for example with 'job autonomy' or 'decision authority'. Since 'freedom of action' and 'responsibility' are closely linked (increased freedom of action could be associated with responsibility for autonomous action), the allocation of the studies was in part ambiguous and some of the studies could probably also have been assigned to the other factor. Even though 'role ambiguity' includes many aspects (Rizzo et al. 1970), studies dealing with 'role ambiguity' were allocated to 'responsibility', as responsibility is one aspect in questionnaires on role ambiguity.

The three studies assigned to 'information/supply of information' (Estévez-Mujica and Quintane 2018; Gardner and Hini 2006; Sonnentag and Spychala 2012) dealt with only a few aspects of this factor. Increasing digitalization and transformation to an industry 4.0 with new technologies like virtual or augmented reality tools offer changes but also health challenges, e.g. information overload, at the workplace (EU-OSHA 2019). The supply of information as a psychological stress factor in SMEs has probably been little researched because digitization and digitalization in SMEs is also progressing slowly and so transformation to industry 4.0, due to the lack of resources (Matt and Rauch 2020).

The same seems to be true for the 'qualification' factor. With the change in work processes toward an Industry 4.0, qualification and further training of employees is playing an increasing role (EU-OSHA 2019). It would therefore be desirable to have solid data in this research area for the SME sector. However, the overall number of studies allocated to this factor is quite low. 'Qualification' was examined as a stress factor with regard to the management of a company (Magola et al. 2018) as well as with regard to the performance of tasks (Myers and Myers 2004). Training in SMEs has also been the subject of two studies (Díaz-Chao et al. 2017; Rahman et al. 2014).

'Emotional demands' were identified as an important stress factor in the context of dealing with customers/patients in medical professions (Gardner and Hini 2006; Magnavita 2018; Myers and Myers 2004). Workplace bullying was examined as an emotional burden on workers (Agervold et al. 2004; Baillien et al. 2011; Lewis et al. 2017). Since bullying is an interpersonal interaction, these studies could also have been assigned to the 'social relations' factor. However, as the studies were mainly concerned with organizational aspects showing a link with bullying, they were classified here. Workplace violence was examined by three studies (Casteel et al. 2008; Setti et al. 2018; Sommovigo et al. 2018). Casteel et al. did not address the psychological impact of robberies on employees, but the study shows that robberies can be reduced if effective occupational safety and health measures are taken. This reduction is likely to have an impact on the mental health of workers, since, for example, bank employees who have been victims of robbery have previously been studied and



known to have health effects (e.g. Giorgi et al. 2015). No study dealt with violence against healthcare workers, although this problem has been discussed for a long time, at least in Germany (AFP/aerzteblatt.de 2021), and was arguably exacerbated by the COVID-19 pandemic, according to International Committee of Red Cross (ICRC 2020). Another study examined the management of emotional demands and related workplace conditions in a call center; as the only one, this study tended to take a resources-based approach (Koskina and Keithley 2010).

Within the dimension 'organization of work', most studies assessed 'work time' (n=16) or 'work process' (n=20) aspects like 'hours worked', 'shift work' or 'work time'. The focus was on 'quantitative workload' as one of many items in occupational stress questionnaires, which is why correlations with an outcome were rarely reported. Aspects that could accompany increasing globalization and digitalization, such as higher work density, unrestricted hours of work and more flexible working hours (EU-OSHA 2019; Zsifkovits et al. 2020) have not yet been sufficiently considered by researchers. Furthermore, the COVID-19 pandemic has accelerated the trend toward telecommuting, mobile work and work from home or even so-called "home offices", for example via government regulations (SARS-CoV-2-Arbeitsschutzverordnung 2021, (BMAS 2021)). The risks associated with the flexibilization or de-limitation of working hours in SMEs urgently need to be investigated in greater detail. This likewise applies to studies on 'communication/cooperation' (n=13), which often examined the ability to communicate and collaborate, but rarely the risks of in terms of quality and quantity and through new forms of communication such as social media or video conferencing as typical means of communication in mobile work.

The studies on 'social relations' were balanced between issues related to colleagues (n=17) and issues related to managers (n=19). The high number of studies on this topic reflects the relevance of this subject for SME-researchers, However, only few studies dealt with leadership styles. Possibly this topic is not yet as present in SMEs, which are often owner-managed companies, as it is in large companies with several hierarchical levels.

Compared to the work patterns 'work content and task', 'organization of work' and 'social relations' few studies dealt with 'working environment' (n=8). Although the effects of physical hazards on the psychological experience of stress and the psychosocial impacts of the working environment on health of workers have been studied as a contributing factor to work-related illness for decades (Cox et al. 2000; Leka et al. 2010), these work characteristics appear to have received little attention by SME researchers. 'Physicochemical factors' (e.g. chemical or biological hazards, lighting, climate, ...) and 'physical factors' (e.g. ergonomics, heavy physical work, ...) were mentioned by three studies each. Whereas only one study (Díaz-Chao et al. 2017) assessed 'workplace and information structure' and two studies dealt with 'work equipment' (Myers and Myers 2004; Sonnentag and Spychala 2012). 'Workplace and information structure' are important areas of research, as are the aspects of communication mentioned above, since new hazards are emerging as a result of the change in working conditions with regard to digitalization, remote work and transformation to an economy in which data processing and smart production are playing an even greater role (Brun and Milczarek 2007; Chirico 2017; Matt et al. 2020).

Further emerging risks affecting health are identified by the European Agency for Safety and Health at Work (EU-OSHA): job insecurity, precarious work, work intensification, and higher demands on workers' flexibility and mobility (Eurofound and EU-OSHA 2014). However, these risks seem to have received little attention in the SME environment, with only n=5 studies addressing on "job insecurity" and few studies focusing on flexible working hours and work-life-balance. Only one study researched the issue of permanent accessibility through new communication technologies (Voss and Drexler 2019).

### ***Economic sectors***

ISIC, the international standard classification system of economic activities, was chosen for allocation of studies to economic sections, as the European NACE and many other national systems of economic classification are based on this classification. The assignment to the economic sections referred to the information provided in the studies, which may have led to an inaccurate

classification in some cases. However, the number of studies in the various sectors approximately corresponded to the sectoral distribution of SMEs in European and Asian countries (ASEAN 2019; eurostat 2011). The sectoral analyses of the enterprises' populations of SMEs in non-financial business in the EU-28 (eurostat 2012) showed, that most SMEs operate in the sector of 'wholesale and retail trade; repair of motor vehicles and motorcycles', followed by 'professional, scientific and technical activities' and 'construction', however in this review second most SME-employees were found in the 'Manufacturing' sector, followed by 'construction'. Most studies (n=17) examined SMEs from the 'manufacturing' sector, although the percentage share, at 20% of SME employment, was considerably lower in the EU28 in 2015 (EC et al. 2016). Section G "wholesale and retail trade; repair of motor vehicles and motorcycles" was the second most frequently investigated sector in this review (n=5), although, in the EU-28, most SMEs are found in this sector and most people were employed there (EC et al. 2016). Perhaps a higher level of lobbying activity in the manufacturing sector compared to other sectors has led to an increased awareness of SMEs in the manufacturing sector by politics and researchers (Hill et al. 2013). Also, the structure of these SMEs with employees who often work on machines on site and are therefore easily accessible or contactable, also made them more suitable for questionnaire surveys, which was the method used in most studies. In addition, these stationary workplaces are easier to assess than, for example, the workplace of a service technician who travels to different companies. which could also have led to these workplaces being investigated less frequently. Only three studies examined SMEs in the Section M "professional, scientific and technical activities" which ranked second in terms of population of SMEs and 4<sup>th</sup> in terms of SME employment in the EU28 (eurostat 2012). This section seemed to be underrepresented when compared to its relevance. We found no studies which examined companies from the sections B., D., E., K, L., O., P. and U which is not surprising, given that they are more typical for large enterprises (e.g. electricity suppliers, oil companies, insurance companies) or public and civil-service institutions (hospitals, schools, public offices) which were excluded.

Within the section Q. 'human health and social work activities' three studies investigated general dentist practitioners (Berthelsen et al. 2008; Myers and Myers 2004) and veterinarians (Gardner and Hini 2006), but no other medical staff of these practices (e.g. medical assistants). Another study focused on workers in health and social care jobs (Magnavita 2015). Although Magola's study about pharmacists did not fully meet our inclusion criteria (pharmacists from large chains were also part of the study population), the study was included in the results because it reflected an important field of human health and pharmacies ultimately fit the structure of an SME (Magola et al. 2018). We proceeded in the same way with Myer's study, in which dentists worked in partial for the NHS and thus were more likely in the public health sector. The focus of the studies was more on physicians, veterinarians or pharmacists, ultimately the entrepreneurs, rather than their staff. There seems to be a gap in current research regarding other staff in healthcare companies. Only Magnavita seems to have addressed this professional group (Magnavita 2015). Although GP (General Practitioners) practices also fit the general structure of an SME, no corresponding study could be included, suggesting that GP practices have not been categorized and/or keyworded as SMEs or there is indeed a lack of studies on occupational stress in GP practices, although there are some studies indicating the high amount of occupational stress in GP practices (Preiser et al. 2021; Ruotsalainen et al. 2015; Siegrist et al. 2010) and several studies focusing on work-related mental strain in these SMEs (e.g. Götz et al. 2013; Leutgeb et al. 2018; Viehmann et al. 2017; Vu-Eickmann and Loerbroks 2017)

### **Outcomes**

The outcomes of included studies were assigned to an adapted classification following the BAUA-project "Mental health in the working world" (Rothe et al. 2017) with the categories general (work-related) stress, health, well-being, factors affecting cardiovascular health, mental health, musculoskeletal system, social relations, and business-related outcomes. The most outcomes

were risks and resources of mental health, general (work-related) stress and business-related outcomes. Compared to a WHO review in 2009 that showed a lack of studies considering the economic benefits of interventions in SMEs (EU-OSHA et al. 2009), the more recent of included studies in particular have also considered economic outcomes (e.g. Cocker et al. (2013); Mihic et al. (2015)). Few studies examined outcomes related to physical health (factors affecting cardiovascular health and musculoskeletal factors), although the correlation between psychological stress in the workplace and somatic illness has already been shown (Li et al. 2015; Siegrist and Li 2017; Siegrist 2021; Theorell et al. 2016; Yang et al. 2016). There seems to be a research gap in the detection of physical health outcomes in terms of psychosocial risks at the workplace.

Outcomes were also divided into positive outcomes/resources and negative outcomes/risks. In the studies included into the review, a balanced distribution between negative and positive outcomes was found only for business outcomes. For social relations, the investigated outcomes were more resources than risks; for general stress and health risks, the negative outcomes predominated. As occupational medicine is basically tasked with maintaining the health of employees, the concept of salutogenesis (Antonovsky and Franke 1997) is increasingly coming to the fore, aiming to improve the health of employees by strengthening resources and creating a healthy work environment. Studies based on the concept of salutogenesis are only available in limited number and quality in the field of occupational science (Melzer and Hubrich 2014), which is also reflected in the findings of this review with more negative outcomes/risks found than positive outcomes/resources.

## **4.2 Strengths and limitations**

Although the exploratory research subject matter of the review was not suitable for a classical systematic review design and meta-analysis, risk of systematic bias was minimized by following and strictly adhering proved review methods (Whittemore and Knafelz 2005) such as systematic literature search in relevant databases based on recommendations specific for reviews in occupational health (Mattioli et al. 2010), reviewing by independent reviewers and the a priori

definition of inclusion and exclusion criteria. Also, well-established methods were used for e.g. literature search, critical appraisal and allocation of studies (Beck et al. 2014; DESA 2008; SURE 2018a; SURE 2018b). Nevertheless, there were some methodological limitations.

The focus on providing the broadest possible overview of the evidence resulted in the search string also being very broad, which led to heterogeneity in included studies. A meta-analysis of the data was therefore neither useful nor possible, yet, it was not the scope of this dissertation. Likewise, even if it was very useful for the research issue, the broad question resulted in a large number of irrelevant hits, which made the review process time-consuming and challenging. For example, the search in the economic database „Business Source Premiere“ revealed a high number of irrelevant hits on financial stress that were unrelated to our research question (Schreibauer et al. 2020). Terms relating to family businesses were omitted in order to reduce the number of irrelevant hits, which may have led to relevant literature being missed. Also, microbusinesses and self-employed may not have been adequately represented by the search string in all databases. For a comprehensive update of this review with a new database query, the search string may need to be adjusted in these regards. Due to this methodological reason, no update of the previous systematic literature search was performed between submission of the manuscript (Schreibauer et al. 2020) and the writing of this thesis.

The objective of the present study was to conduct a systematic literature review that was as comprehensive as possible, however, by omitting grey literature (e.g., governmental or institutional reports), unreviewed literature and dissertations; thus, possibly existing evidence on this aspect was overlooked. Likewise, the exclusion of other publication languages than German and English may have led to finding no studies from e.g. Africa and South America. The omission of keywords related to family businesses and the use of a European definition of SEMs may also have contributed to this. A larger, multilingual review team could contribute to an improvement in this respect, which, however, was not possible within the scope of this doctoral thesis. In summary, the broad scope of the research question has limitations. It would be useful to examine the psychosocial

factors in the individual problem areas addressed, such as family businesses and microenterprises, as well as research from Africa and South America, in separate reviews that focus specifically on these issues.

Although critical appraisal was carried out with well-established tools (SURE 2018a; SURE 2018b; SURE 2018c; McArthur et al. 2015), the evaluation in detail was influenced by personal assessment of the author and other raters might have come to a different judgement in parts. This aspect can likewise apply to the assignment of the studies to the characteristic domains of the GDA-table (Beck et al. 2014, p.17-19). Due to the partial similarities and/or linkages between some stress factors, the assignments were not always clear-cut, and some studies could certainly have been assigned to a different factor. However, unclear assignments or categorizations, e.g. when preparing the search string, assigning dimensions to the GDA table or allocating economic sectors, were repeatedly discussed with members of the research group during the work process. The transferability of the characteristic domains of the GDA recommendations table to other country settings might also be limited, as it refers to a German context. Nevertheless, the GDA table has a high degree of concordance with other classifications, including international ones (see chapter 2.3.2).

Few intervention studies were found, which may be a result of using the PEO scheme. The broad and non-specific research question may also have contributed. A renewed intervention-specific search could yield more specific results. However, a recent review examining health-related interventions in SMEs (Gerhardt et al. 2019) also found only few (n=15) intervention studies. Gerhardt et al. (2019) did not focus specifically on occupational stress factors but on work- or person-related interventions in SMEs and their effectiveness on employees' health, well-being, and work-related behavior. In addition, studies in companies with more than 250 employees were included. Therefore, only one of their included studies (Torp 2008) met the inclusion criteria of this review (Schreibauer et al. 2020).

### **4.3 Prospects and recommendations for further research**

Working conditions impact not only on the physical but also on the mental health of employees (Leka et al. 2010). The results of this review show that there are still gaps in research on psychosocial stress factors in SMEs in terms of quantity and quality. In particular, there seems to be a lack of high-quality study designs using qualitative and quantitative methods. Furthermore, the psychosocial risks of a changed working world since the beginning of the century, e.g., due to increasing globalization and the development of new (communication) technologies, seem to have received little attention in SME research so far.

Today's working world, transforming into an economy 4.0, involves new requirements such as a changed organization of work, new forms of employment (e.g. freelancing), new forms of work (e.g. teleworking, home office, coworking spaces), technically supported communication (e.g. through new media and digital communication tools), networked production, "Big Data", etc. and thus brings new challenges to the design of everyday working life and the flexibility and qualification of employees. The impact of these changes on SMEs has been well studied in recent years (Chirico 2017; EC 2019; EU-OSHA 2020b; Zsifkovits et al. 2020). For example, SMEs in particular often have few human and financial resources for necessary changes (e.g. digital transformation), which can have an impact on necessary occupational health and safety measures (EU-OSHA 2005). Recently, the transformation has been accelerated in (not only) SMEs as a result of the COVID-19 pandemic infection control measures (EU-OSHA 2020a; Mandviwalla and Flanagan 2021) resulting in new technical but also social challenges for employees (e.g. mobile work and an increasing use of new communication tools). These challenges can be both opportunities (e.g., less time spent commuting, more flexible work schedules) and risks (e.g., social isolation or poor home office ergonomics) to employees' mental and physical health (Eurofound 2021). It could be assumed, that these changes will persist in the future (Eurofound 2020) and will have long-term effects on the structure of the working world.



Already at the beginning of the century, an increase in work density and performance pressure among employees was noted, which was associated with improved performance measurement through the use of computer systems, a change in work organizations and also a change in employee effort (Green 2004). This trend appears to have progressed further with the development of an increasingly globalized market economy and the concomitant increase in economic competitive pressures, as surveys of employee representatives recently showed (Ahlers 2020). The demands on production and product development have been subject to constant change processes in recent years due to Industry 4.0 with "production on demand", which may also have increased the pressure on employees. This effect may also be reinforced by an economy focused on continuing growth, increasing consumption or even maximizing profits, which to date has resulted in the exploitation of resources and people as well as environmental destruction and has driven climate change through the use of fossil fuels (Meadows et al. 1972; Sula-Raxhimi et al. 2019). For some time now, social associations and climate activists, as well as scientists, have been calling for a restructuring of today's economy away from profit maximization strategies and towards a sustainable, resource-conserving economy with social working conditions and wages (e.g. DGB NRW and NABU NRW (2010), <https://www.earth4all.life/>, last access: 2022/08/06)). At the same time, organizations have emerged that call for and advocate for a common good economy (e.g., <https://www.ecogood.org/> last access: 2022/08/06). In the meantime, an exit from the fossil economy and the necessary transformation to a "green economy" has become a global consensus, as demonstrated, for example, by the Paris Climate Agreement (EU 2016). In Germany, for example, green economy stands for a paradigm shift towards an economy that recognizes planetary boundaries and is consistent with ecological and social goals (Renault et al. 2016). All of these aspects have been exacerbated with the collapse of supply chains due to the containment measures in the context of the Corona pandemic and, currently, the energy crisis caused by the Ukraine war. And at the moment, there is a sense that the shift to a green economy may be accelerating.

Both social associations and climate activists have for some time now been calling for a restructuring of this economy, moving away from profit maximization strategies toward a sustainable, resource-conserving economy with fair working conditions and wages. At the same time, organizations have emerged that call for and work towards an economy based on the common good (e.g. <https://www.ecogood.org/>, last access 2022/08/08). In the meantime, an exit from the fossil economy and the necessary transformation to a "green economy" has become a global consensus, as demonstrated, for example, by the Paris Climate Agreement. In Germany, for example, the Federal Environment Agency calls this a paradigm shift. The economy should continue to develop in the sense of "green transformation" and be in harmony with ecological and social goals and considering planetary boundaries (Renault et al. 2016).

Since SMEs make up a large proportion of companies worldwide, their contribution to climate protection and to social working conditions is of great importance. Efforts are underway worldwide to help SMEs transform into sustainable, green and social enterprises and make them "fit for the future", e.g. "the EaP green economies project" of OECD (<http://www.green-economies-eap.org>), the "European SME-strategy" ([https://ec.europa.eu/growth/smes/sme-strategy\\_en](https://ec.europa.eu/growth/smes/sme-strategy_en), last access: 2022/08/08), the "Small Business Environmental Assistance Program (SBEAP) of U.S. (<https://nationalsbeap.org/>), or the comprehensive current initiative "KlimaNEUtralität" of the German SME-focused foundation „Mittelstand – Gesellschaft – Verantwortung" and its activity "Offensive Mittelstand – Gut für Deutschland" (<https://www.offensive-mittelstand.de/serviceangebote/aktuelle-infos/maerz-2022-klimaneutralitaet-und-nachhaltigkeit-chancen-und-risiken-fuer-kmu>, last access: 2022/05/24).

Family entrepreneurs and SME owners in particular are sometimes faced with the challenge of finding a successor, and the entrepreneurs are also concerned about the future of their enterprise and the future and health of their employees, as they seem to be often much more emotionally tied to their company and their employees. Therefore, some SME-owners transfer their enterprises in an employee-owned (steward-ownership) business (Vetter 2016), and some organizations support and accompany this transfer, e.g. purpose

(<https://purpose-economy.org/en/>). These forms of enterprises offer employees new values and new structures for organizing their work and there are indications, that employees of employee-owned companies have higher levels of job satisfaction and health (EOA 2012). New forms of corporate management have also emerged in the recent past and could be useful to adapt firms to new market demands and to new societal structures. One new variant, for example, is "teal organizations," which operate without a management board (Laloux 2015).

The effects of the psychosocial factors of these types of enterprises or management styles on the mental and physical health of employees would be a worthwhile new field of research. By identifying health-promoting and health-risk factors on these new forms of enterprises, it is possible for researchers to contribute to the development of sustainable enterprises with healthy workplaces. The prevention of psychosocial risks in an industrial environment, transforming into an Industry 4.0 and into a "green economy" with new and changing psychosocial risks, accelerated under the impression of the COVID-19 pandemic, the climate change and the Ukraine war, should also be the subject of further research especially in SMEs.

As early as 1997, Cooper et al. called for new studies to examine the long-term effectiveness of stress interventions (Cooper et al. 2000). In addition, a recent review of occupational health research further noted that there is an overall lack of intervention studies and high-quality qualitative research on explanatory factors (Di Fan et al. 2020). Di Fan et al. (2020) called for researchers to consider these points in future projects. With the results of this thesis, these calls can be confirmed and renewed. In addition, it is important to emphasize a focus on SMEs, since psychosocial risks differ between SMEs and large companies (Encrenaz et al. 2019; Tsai et al. 2007; Yeh et al. 2018), and the majority of companies worldwide are medium, small and very small enterprises (see chapter 1.2). Long-term studies should be conducted to investigate the cost efficiency and effectiveness of occupational health and safety measures in order to motivate entrepreneurs and managers of SMEs and convince them of their benefits. In occupational health and safety, protective measures are usually ranked according to the STOP concept (first substitution of hazardous activities/working

materials followed by technical measures, next organizational measures and subsequently personal protective measures (e.g. personal protective equipment). This principle should also be applied to measures for the prevention of mental risks according to the principle of primary prevention, which should take precedence over secondary or tertiary prevention. It would therefore make sense to favor studies on the primary prevention of mental risks using substitution measures as well as technical and organizational measures at the workplace instead of focusing on, for example, studies on improving resilience and stress management among employees which would be rather equivalent to personal protective equipment. Interventions for prevention of mental risks at work should also be investigated with high-quality study designs regarding the long-term effects, to convince entrepreneurs or owners of SMEs of their effectiveness, which is particularly important for SMEs with limited financial and human resources as Leka et al. previously stated (Leka et al. 2010). This is the starting point for e.g. the recent cluster-randomized study within the *IMPROVEjob* research consortium focusing on situational and behavioral prevention of psychological stress in GP practices (Weltermann et al. 2020).

In this context, it would be desirable to consider and measure the broadest possible field of work-related psychosocial stress factors instead of focusing only on individual aspects of mental stress. For this purpose, the dimensions of psychosocial risks of the GDA recommendations table (Beck et al. 2014, p.17-19) seemed to provide a good framework as it includes most of the psychosocial factors of existing work stress definitions and also the category "new forms of work". One recent example of a study using the GDA-categorization is an investigation and intervention in family practices in Germany (Preiser et al. 2021). In particular, researchers should address emerging risks due to a changing work environment and changes in work organization and communication through digitalization and Industry 4.0, as well as new physical and psychological risks due to changing climatic conditions, e.g., more heat days (Walinski et al. 2023).

Furthermore, it would be valuable, if outcomes referred not only to psychological consequences of mental stress (e.g. mental illness, perceived stress etc.) for employees but also to physical consequences (e.g. heart diseases, back pain,

...) and effects on the performance of employees and financial consequences for the company. These aspects have been given too little attention in previous research, especially in SMEs. The assessment of outcomes should also be guided by established measurement methods due to better comparability with previous research. In the studies included here, approximately one-third of the identified outcomes were measured with self-developed items, scales, or questionnaires, or with pre-existing but adapted questionnaires. This may complicate comparison with previous study results and affect the reliability and validity of results (risk of bias). A valuable listing of occupational stress questionnaires was provided by Leka et al. (Leka et al. 2010, p.12-22). For specific questions and settings, it may nevertheless be useful and necessary to develop new instruments and examine them in terms of validity and reliability. The advantages and disadvantages of using established measurement methods should be carefully discussed. Previous research has emphasized this and provided valuable input for the development of new measurement instruments (Fagarasanu and Kumar 2002).

## **5 Conclusions**

The results of this review show that psychosocial factors in SMEs have been little researched in SMEs today. There are still gaps in research regarding the psychosocial factors, the outcomes and the economic sectors investigated.

Research gaps related to the psychosocial factors occur particularly with regard to “new forms of work” and factors associated with new requirements that have arisen as a result of changes in the “working environment”. These changes have been and are currently being accelerated by the consequences of the Corona-pandemic and the challenges and consequences of climate change, which are having an even greater impact on companies and the health of employees. The different economic sectors also appear to have been researched with varying degrees of intensity. The focus of research to date has been on the manufacturing sector, whereas little research has been done on the sectors e.g. “Professional,

scientific and technical activities” and “Wholesale and retail trade, repair of motor vehicles and motorcycles” and the human health sector.

When looking at the outcomes investigated, it became apparent that little research has been conducted on outcomes related to physical health and effects on the performance of employees and the financial situation of companies. Research on supportive resources, in the context of a salutogenetic understanding of health, also seems to have received insufficient consideration so far. Small and medium-sized companies are particularly affected by health effects of stress factors in the workplace because sick leave can have a much greater impact given their smaller financial and human resources compared to larger firms. However, especially among SME managers, the awareness and systematic assessing of health risks in the workplace is often not the first priority. SME researchers should step up in efforts to provide KMU managers with interventions, that proved to be (cost-)effective and (cost-)efficient. For improving health and safety of SME-employees it would be important to motivate SME-managers and convince them of the effectiveness of health and safety measures in their enterprises, particularly today, when profound structural changes and transformation to “green economy” lie ahead (Renault et al. 2016). Therefore, the quality and quantity of SME-focused research on psychosocial factors and on interventions to reduce psychosocial hazards have to be improved in future, taking new challenges and emerging risks and resources into account.

## **6 Executive Summary**

Psychological stress at work acts as a stressor on employees and can result in psychological and physical illnesses if it lasts longer and exceeds the capacities and resources of the individual, resulting in high costs for the individual, the economy, but also the society. In order to be able to prevent these negative effects, experts need sufficient knowledge about psychosocial stress factors, risks and resources in the workplace. SMEs make up the majority of all companies worldwide and employ more than 60% of all workers, so research on them is of central importance. Due to their structure, they have fewer human and financial resources for managing sickness absence and also for occupational health and safety management, which could prevent such absence. In order to develop effective interventions for SMEs to prevent psychosocial risks, researchers need reliable evidence on psychological factors. As there is evidence that mental health risks and resources in SMEs differ from those in large companies, the aim of this literature review was to assess and categorize the current state of research on psychosocial factors in SMEs with well-established methods. A systematic database search of PubMed, PsycINFO, PSYINDEX, and Business Source Premiere between March and June 2019, updated in January 2020, detected 116 studies for full-text analysis. Of these, data from 45 studies were analyzed and the psychological factors identified were classified into five domains: "work content and task," "work organization," "social relationships," "work environment," and "new forms of work", according to GDA (Beck et al. (2014), p.17-19). Furthermore, the economic sectors and outcomes examined were identified and analyzed. With the results of this review, a need for more and qualitatively better research on psychosocial factors in SMEs was identified, especially on current and new challenges that (will) arise with increasing digitalization and the transformation to a "green economy". Similarly, more attention should be paid to changing working conditions and the associated psychosocial risks in the face of changing climatic conditions and associated health hazards, such as pandemic situations.

## 6.1 Zusammenfassung

Psychosoziale Faktoren am Arbeitsplatz wirken als Stressoren auf die Beschäftigten und können, wenn sie länger andauern und die Kapazitäten und Ressourcen des Einzelnen übersteigen, zu psychischen und physischen Erkrankungen führen und haben hohe Kosten für den Einzelnen, die Wirtschaft, aber auch die Gesellschaft zur Folge. Um diesen negativen Auswirkungen vorzubeugen zu können, benötigen Experten ausreichende Kenntnisse über psychosoziale Stressfaktoren, Risiken und Ressourcen am Arbeitsplatz.

KMU machen die Mehrheit aller Unternehmen weltweit aus und beschäftigen mehr als 60 % aller Arbeitnehmer, daher ist die Forschung über sie von zentraler Bedeutung. Sie verfügen durch ihre Struktur über weniger personelle und finanzielle Ressourcen für das Management krankheitsbedingter Fehlzeiten und auch für den Arbeitsschutz, der solche Fehlzeiten verhindern könnte. Um wirksame Maßnahmen für KMU zur Verhinderung psychosozialer Risiken zu entwickeln, benötigen die Forscher zuverlässige Erkenntnisse über psychologische Faktoren. Da es Hinweise darauf gibt, dass sich die Risiken und Ressourcen für die psychische Gesundheit in KMU von denen in Großunternehmen unterscheiden, bestand das Ziel dieser Literaturübersicht darin, den aktuellen Stand der Forschung zu psychosozialen Faktoren in KMU mit bewährten Methoden zu bewerten und zu kategorisieren. Eine systematische Datenbankrecherche in PubMed, PsycINFO, PSYINDEX und Business Source Premiere zwischen März und Juni 2019, aktualisiert im Januar 2020, ergab 116 Studien für die Volltextanalyse. Von diesen wurden 45 Studien in die Datenanalyse eingeschlossen und die identifizierten psychologischen Faktoren fünf Bereichen zugeordnet: "Arbeitsinhalt und -aufgabe", "Arbeitsorganisation", "soziale Beziehungen", "Arbeitsumgebung" und "neue Arbeitsformen" (Beck et al. 2014, S.17-19). Darüber hinaus wurden die untersuchten Wirtschaftsbereiche und Outcomes identifiziert und analysiert.

Mit den Ergebnissen dieses Reviews wurde ein Bedarf an mehr und qualitativ besserer Forschung zu psychosozialen Faktoren in KMU ermittelt, insbesondere zu aktuellen und neuen Herausforderungen am Arbeitsplatz, die sich mit der



zunehmenden Digitalisierung und der Transformation zu einer "Green Economy" ergeben (werden). Ebenso sollte den sich verändernden Arbeitsbedingungen und den damit verbundenen psychosozialen Risiken angesichts sich verändernder klimatischer Bedingungen und damit verbundener Gesundheitsgefahren, wie etwa Pandemien, mehr Aufmerksamkeit geschenkt werden.

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## **Erklärung zum Eigenanteil**

Diese Dissertationsschrift wurde von der Doktorandin Elena Christina Schreibauer verfasst. Hierbei wurden keine weiteren als die angegebenen Quellen verwendet. Die Fragestellung für diese Dissertation wurde von der Doktorandin gemeinsam mit Frau Prof. Rieger (Ärztliche Direktorin, Institut für Arbeitsmedizin, Sozialmedizin und Versorgungsforschung (IASV), Universitätsklinikum Tübingen) und Frau Dr. Rind (Leitung Forschungsschwerpunkt Gesundheitsversorgung für Menschen im Erwerbsalter am IASV, Tübingen) erarbeitet. Das Studiendesign entstand in Zusammenarbeit mit Frau Prof. Rieger und Frau Dr. Rind.

Die Erarbeitung der Methodik und die Datenbankrecherche inklusive der Übertragung der Suchergebnisse in die Software Rayyan sowie alle Review-Schritte (Screening nach Titel und Abstrakt, Volltextscreening, Datenanalyse) erfolgten durch die Doktorandin Elena Schreibauer. Zur Erarbeitung der Methodik erhielt Frau Schreibauer fachliche Ratschläge durch Frau Dr. Anke Wagner (wissenschaftliche Mitarbeiterin am IASV, Tübingen).

Die Zusammenstellung der Schlagworte für die Datenbankrecherche erfolgte im fachlichen Austausch mit Frau Stephanie Burgess (damals wissenschaftliche Mitarbeiterin am IASV) und Frau Melina Hippler (damals wissenschaftliche Hilfskraft am IASV, zum Zeitpunkt der Einreichung der Dissertationsschrift Projektleiterin am Laboratory for Clinical and Experimental Neuro-Oncology des Hertie-Instituts für klinische Hirnforschung, Tübingen), sowie im Rahmen von Besprechungen mit Frau Dr. Rind und Frau Prof. Rieger, die bei der Zuordnung zu den Unterpunkten ihre Expertise einfließen ließen. Als zweite Reviewerinnen unterstützen Frau Burgess beim Titel/Abstrakt-Screening und Frau Melina Hippler beim Screening der Volltexte. Frau Melina Hippler war außerdem bei der Suche nach Volltexten und bei der Organisation der Literatur helfend tätig.

Zum selbstständig verfassten Manuskript der Dissertationsschrift erhielt die Doktorandin Elena Schreibauer Rückmeldung durch Frau Dr. Rind und Frau Prof. Dr. Rieger. Die entsprechenden Eigenanteile der Publikation können zudem aus einer Tabelle (authors contributions) im Anhang entnommen werden.

Benjamin Lee (native speaker) aus Tübingen übernahm die Überprüfung der englischen Texte der Publikation von 2020 hinsichtlich Rechtschreibung, Interpunktion und Grammatik. Eine inhaltliche oder stilistische Überprüfung der Texte wurden durch ihn nicht vorgenommen.

## 8 Publications

Contents of this Dissertation have already been published as follows:

### Article in peer-reviewed journal:

**Schreibauer, EC; Hippler, M; Burgess, S; Rieger, MA; Rind, E.** Work-Related Psychosocial Stress in Small and Medium-Sized Enterprises: An Integrative Review. *Int J Environ Res Public Health*. 2020.(17). DOI: <https://doi.org/10.3390/ijerph17207446>.

**Impact Factor:** 2,849 (2020); 5-Year Impact Factor: 3.789 (2020)

For the authors' contributions, please see annex.

### Conference presentations:

**Schreibauer E, Hippler M, Burgess S, Rieger MA, Rind E.** Arbeitsbedingter psychosozialer Stress in kleinen und mittleren Unternehmen: ein integrativer Review. 61. Jahrestagung, Deutsche Gesellschaft für Arbeitsmedizin und Umweltmedizin e.V., 17.-20.3.2021, online-Kongress, Kongressdokumentation, Hrsg. Deutsche Gesellschaft für Arbeitsmedizin und Umweltmedizin e.V., Simone Schmitz-Spanke, Jessica Lang, Gentner-Verlag, ISBN: 978-3-9817007-9-4, online verfügbar unter: [https://www.dgaum.de/fileadmin/pdf/Jahrestagung/2021\\_Jena/Tagungsband\\_DGAUM2021\\_20210915\\_01.pdf](https://www.dgaum.de/fileadmin/pdf/Jahrestagung/2021_Jena/Tagungsband_DGAUM2021_20210915_01.pdf), S. 346 (Abruf zuletzt am 10.10.2023)

**Abschlusskonferenz IMPROVEjob 15.09.2021:** Psychische Gesundheit in Hausarztpraxen und kleinen und mittleren Unternehmen - Wissenschaft und Praxis im Dialog. Impulse talk for breakout room discussion

**Schreibauer, E.** Verhältnisprävention und psychische Gesundheit in KMU.2021

## Annex

**Table 11** Summary of study characteristics, previously published (Schreibauer et al. 2020), adopted originally.

Addendum

\* For better readability, indicating references for assessment instruments (e.g. questionnaires) used within the cited studies have not been named. Source references can be found in original literature. References were only given in case when the cited study used methods for measurement taken from another study and this reference was cited by authors.

† Due to limited space, only the first author is named.

<sup>1</sup>Measurements of outcomes. <sup>2</sup>Measurements of confounders / mediators /control variables.

Authors and year; Country†	Year of data collection	Topic	Design	Data-collecting methods	Type of enterprise; sample size (n); industrial classification according to ISIC Rev. 4	Investigated psychosocial demands (according to GDA [39])	Outcomes	Data collection instrument(s) *
Myers et al. 2004; United Kingdom	1999-2000	Investigation of overall stress, work stress and health in general dental practitioners (GDPs).	Cross-sectional study	A nationwide survey was conducted on GDPs of health authority lists.	General private dental practices; n=2441 GDPs; Q. Human health and social work activities	1. Work content and task: qualification, emotional demands 2. Organization of work: work process 3. Social relations: - 4. Working environment: work equipment 5. New forms of work: - (subsequently, we only report work characteristics investigated)	Main outcomes: perceived stress; health  Minor outcomes: work environment: (stressful work-related conditions; job dissatisfaction)	<u>Perceived stress</u> <sup>1</sup> : perceived stress scale <u>Health</u> <sup>1</sup> : General Health Questionnaire (GHQ-12) Health-related behaviors questionnaire (unspecified),

minor ailments and symptoms checklist (unspecified)  
Work environment<sup>1,2</sup>: specific dental questions (self-developed), The Work Stress Inventory for Dentists (WSID), adapted by the authors  
Job dissatisfaction<sup>1</sup>: the Job Dissatisfaction Measure

Agervold et al. 2004; Denmark	Un-known	The stress levels of bullied and non-bullied employees were assessed and the relationship between bullying and other psychosocial factors was investigated.	Cross-sectional study	The study was part of a survey to map quality of work environment and employee well-being in one company.	Food manufacturing company; n=202 employees; C. Manufacturing	1. Work content and task: emotional demands 3. Social relations: colleagues, managers	Main outcome: bullying at work  Minor outcomes: mental fatigue; self-reported sick-leave; psychological stress; psychosomatic symptoms	<u>Bullying at work</u> <sup>1</sup> : checklist of negative acts, partly based on the Negative Acts Questionnaire' (NAQ); additionally, a single item was used <u>Working conditions</u> <sup>2</sup> , <u>Minor outcomes</u> <sup>1</sup> : 'The Psychosocial Work Environment and Stress
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Questionnaire'  
(PWSQ)

Cooper 2005; country not reported	No data collected	Theoretical discussion of the future of work in general with a focus on career, stress and well-being of small and medium-sized enterprises (SMEs).	Narrative review	Unsystematic literature review	SMEs, freelancer; n= not relevant; no sector reported	5. New forms of work	-	-
Allan et al. 2005; country not reported	No data collected	The stress caused by online collaboration in SME staff was researched. Online team roles as possible stressors were reported.	Narrative review	Unsystematic literature review	SME; n= not relevant; no sector reported	1. Work content and task: qualification 2. Organization of work: communication/cooperation 3. Social relations: managers 5. New forms of work	-	-
Bennett et al. 2006; USA	Un-known	The relationship between occupational stress and	Cross- sectional study	The study was based on data of a randomized controlled trial	26 SMEs: 50-150 employees n= 1442; C. Manufacturing	1. Work content and task: freedom of action 2. Organization of work: work process 4. Working environment:	Leisure time physical activity (LTPA)	<u>LTPA</u> <sup>1</sup> ; A semi-quantitative activity Questionnaire <u>Job strain</u> <sup>2</sup> ;

		LTPA (leisure time physical activity) and their modification by race or ethnicity was investigated.		of the Healthy Directions small business study. Data were collected by interviewer-administered survey		physical factors		A modified version of Karasek's Job Content Questionnaire (JCQ)
Gardner et al. 1999 2006; New Zealand	1999	The causes of work-related stress in the veterinary field were explored, as well as what stress levels were experienced and what social support veterinarians used to cope with work-related stress.	Cross-sectional study	A postal survey was distributed to veterinarians registered with the Veterinary Council of New Zealand.	Veterinarians; n=849; M. Professional, scientific and technical activities	1. Work content and task: information/ supply of information; responsibility; qualification; emotional demands 2. Organization of work: working time; communication/cooperation; 3. Social relations: colleagues; managers	Work stress; level of stressful situations at work; personal stress; sources of support; social support; depression	<u>All measurements</u> <sup>1,2</sup> ; survey, developed by the Veterinary Council of New Zealand and New Zealand Veterinary Association
Nakata et al. 2002 2006; Japan	2002	The association between the broad aspects of job stress and occupational injuries in	Cross-sectional study	Factories randomly selected from a directory were contacted by phone and asked to	244 SMEs; n= 1770; C. Manufacturing	1. Work content and task: freedom of action; qualification 2. Organization of work: work process; communication/cooperation 3. Social relations: colleagues; managers	Occupational injury	<u>Occupational injury</u> <sup>1</sup> ; dichotomized single question item <u>Job stress</u> <sup>2</sup> : The Japanese version of the Generic Job Stress

		SMEs was examined.		participate in a self-administered questionnaire survey.				Questionnaire (GJSQ), developed by the US National Institute for Occupational Safety and Health.
Chuang 2006; country not reported	No data collected	Stress-related factors in small businesses were examined. (role conflict, work family conflict, role stress, levels of job satisfaction, role ambiguity, role overload)	Narrative review	Unsystematic literature review	Small businesses (50-200 employees) were theoretically discussed; no sector reported	1. Work content and task: variability; responsibility 2. Organization of work: working time; work process	-	-
Nakata et al. 2007; Japan	2002	The association of job stress with sleep-related breathing disturbance (SBD) was investigated.	Cross-sectional study	Factories randomly selected from a directory were contacted by phone and asked to participate in a self-administered questionnaire survey.	292 SMEs; 1–158 workers; n= 1940 males; C. Manufacturing	1. Work content and task: freedom of action; qualification 2. Organization of work: work process; communication/ cooperation; 3. Social relations: colleagues; managers	sleep-related breathing disturbance (SBD)	<u>SBD</u> <sup>1</sup> : adopted single-question item, used before in several studies <u>perceived job stress</u> <sup>2</sup> : The Japanese version of the Generic Job Stress Questionnaire (GJSQ)



Tsai et al. 2007; United Kingdom	2005	The association of firm size with job satisfaction was investigated.	cross-sectional study	Interviews with managers to assess context information and a structured employee questionnaire were used.	SMEs, 2-250 employees; n= 384; C. Manufacturing, J. Information and communication, R. Arts, entertainment and recreation	1. Work content and task: freedom of action; qualification 2. Organization of work: working time; work process 3. Social relations: managers 5. New forms of work	dependent variables: job autonomy; attitudes to managers; extent of and satisfaction with training; promotion opportunities; job security; intention to leave; work pressure and effort;	<u>dependent variables</u> <sup>1</sup> : self-developed, pilot-tested, structured employee questionnaire, based on the WERS questions (Kersley et al., 2006) and those reported by Gallie et al. (2004) (a series of standard questions deployed in British surveys since 1986) also new questions were designed. <u>market strength</u> <sup>2</sup> : self-developed index (from the information provided by managers and expert opinions) <u>formality</u> <sup>2</sup> : overall index of the formality of HRM practices, followed by Way (2002).
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Berthelsen et al. 2008; Denmark	2002	The extent to which Danish general dental practitioners perceived support from colleagues and the relation of this support to demographic and work-related background was investigated.	Cross-sectional study	A postal questionnaire was used to collect data of a random sample of dentists.	Dentists from the register of the Danish Dental Association n= 221; Q. Human health and social work activities	2. Organization of work: communication/ cooperation 3. Social relations: colleagues	Perceived practical support; availability of contact with colleagues; emotional support	All variables!: self-developed and pilot-tested questionnaire
Casteel et al. 2008; USA	1997-2000	The effectiveness of a robbery and violence prevention program in small businesses in Los Angeles was introduced.	Intervention study	Basic data as well as follow-up data on risk factors for violence and preventive measures were collected by security consultants. Violent crimes were identified by linking data from an electronic police directory with	Small, independently owned businesses; 305 intervention businesses, 96 control businesses n=?; G. Wholesale and retail trade; repair of motor vehicles and motorcycles; I. Accommodation and food service activities	1. Work content and task: emotional demands	Number of violent crimes (after a consultation on violence-preventing measures such as organizational and environmental improvements, compared to a control group without intervention)	Number of crimes identified by Los Angeles Police Department records

the address  
data of the  
companies  
participating in  
the study.

Rau et al. 2008; Tri-border corner of Germany, Czech Republic and Poland	2004	Work characteristics and success of entrepreneurs and the link to the health of entrepreneurs were researched.	Cross- sectional study	Data on businesses and work characteristics were collected by structured interviews and by questionnaires . On a working day, participants received 24- hour outpatient blood pressure monitoring.	Entrepreneurs; 5-50 employees; n= 53; A. Agriculture, forestry and fishing J. Information and communication	1. Work content and task: freedom of action; responsibility 2. Organization of work: working time; work process	Depression; anxiety; vital exhaustion; sleep disorders; increased blood pressure	<u>Anxiety and depression</u> <sup>1</sup> ; Hospital Anxiety and Depression Scale (HADS-D) <u>Vital exhaustion</u> <sup>1</sup> ; Maastricht Questionnaire (MQ) <u>Sleep disorder</u> <sup>1</sup> ; Schlaf-Wach- Erlebensliste [Sleep Wake Experience List] (SWEL) <u>Blood pressure</u> <sup>1</sup> ; 24h - blood pressure monitoring <u>Working conditions</u> <sup>2</sup> ; Job Demand/ Control- Questionnaire (JDC)
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Torp 2008; Norway	Un-known	A two-year training program in health and safety management (H&S) for managers of motor vehicle repair garages was examined with regard to implementation of H&S management procedures and effects on workers' perception on the physical and psychosocial working environment and their health.	Intervention study	The effects were investigated by questionnaires sent to managers (questionnaire on H&S) and workers (questionnaire on the working environment and musculoskeletal pain) before and after a HS- training intervention.	Motor vehicle repair garages; 2-140 employees; (n=226); G. Wholesale and retail trade; repair of motor vehicles and motorcycles	1. Work content and task: freedom of action; responsibility 3. Social relations: colleagues; managers	Implementation of H&S management procedures:  psychosocial working environment: decision authority;  social support; management support  health measure: musculoskeletal pain	<u>Management procedures and psychosocial working environment</u> <sup>1,2</sup> : self-constructed questionnaire  <u>Musculoskeletal pain</u> <sup>1</sup> : Health Complaints Questionnaire
Ikeda et al. 2009; Japan	2002	Factors associated with depressive symptoms were	Cross-sectional study	Survey with a self-rating questionnaire.	292 SMEs; 1–158 employees; n=2302; C. Manufacturing	1. Work content and task: freedom of action; qualification 2. Organization of work: work process; communication/ cooperation 3. Social relations:	Depressive symptoms	<u>Depressive symptoms</u> : Japanese version of the Center for Epidemiologic Studies Depressive

		investigated in SMEs.				colleagues; managers		Symptoms Scale (CES-D) <u>Job stressors:</u> Japanese version of Generic Job Stress Questionnaire (GJSQ) SME stress questions (SMESQ)
Villanueva et al. 2009; Australia	Un-known	SME employees' intentions to leave the organization were examined in relation to their perceived occupational stress.	Cross-sectional study	After information in a staff meeting a questionnaire was distributed to the employees by the management. The completed questionnaire was returned to the researchers by letter.	SMEs with 50-100 employees; N=154; C. Manufacturing, M. Professional, scientific and technical activities N. Administrative and support service activities	1. Work content and task: responsibility 2. Organization of work: working time 3. Social relations: colleagues; managers	Intention to leave	<u>Intention to leave:</u> five-item scale developed by Wayne et al. (1997). <u>Perceived organizational support:</u> the short version of the Survey of Perceived Organizational Support (SPOS) <u>Occupational stress</u> : "sources of pressure" scale <u>Job satisfaction:</u> 12-item scale, based on the Job Descriptive Index, developed by

Smith, Kendall, and Hulin (1969)

Koskina 2010; Greek	Un-known	By looking at the context and control of emotional performances and the work conditions that would create a positive working atmosphere, the nature of emotion management in call-centers was explored.	Qualitative case study	Data was obtained through interviews with customer service representatives, supported by interviews with different levels of management and supplemented by limited non-participant observations.	SME n=28; J. Information and communication	1. Work content and task: emotional demands	Emotion management	Semi-structured interviews, supplemented by limited non-participant observation
Wang et al. 2009; Taiwan	2005-2006	The relationship between psychosocial job characteristics and fatigue was investigated, and risk factors for fatigue among	Cross-sectional study	During a health examination a blood sample and self-administered questionnaires on demographic information, work and lifestyle as	Small enterprises <50 employees; n=647; no sector reported	3. Social relations: managers	Fatigue	<u>Fatigue<sup>1</sup></u> : Chinese version of checklist individual strength (CIS) <u>Psychosocial work characteristics<sup>2</sup></u> : validated Chinese version of the Job Content Questionnaire (JCQ)

employees of SMEs enterprises were determined.

well as psychosocial work characteristics, fatigue and mental stress were collected from each participant.

Psychological distress<sup>2</sup>:  
The Taiwanese depression questionnaire (TDQ)

Rhee 2010; Korea and Japan	2001	The effect of trust on work stress was investigated. Three dimensions of trust were examined with regard to their different positions as antecedent, moderating and mediating factors in the cause of stress.	Cross-sectional study	Data was collected by self-administered and structured questionnaires of a randomly selected sample of Korean and Japanese SME workers.	Small and medium-sized firms < 120 employees; Korean workers n=376 Japanese workers n=77; C. Manufacturing	1. Work content and task: freedom of action 2. Organization of work: work process communication/cooperation; 3. Social relations: colleagues; managers 4. Working environment: physicochemical factors	Main outcome: perceived stress;  Secondary outcomes: stress reaction: stress symptom prevalence; job satisfaction	<u>Self-developed questionnaire<sup>1,2</sup></u> ; <u>Perceived stress<sup>1</sup></u> : single question item <u>Stress reaction<sup>1</sup></u> : two dimensions: stress symptom prevalence (measured by summation of subjective severity of non-specific stress symptoms) and job satisfaction (single item) <u>Work-related stressors<sup>2</sup></u> : scales, selected from the NIOSH Generic Job Stress Questionnaire <u>Workers trust<sup>2</sup></u> :
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modified version of the Organizational Trust Inventory, Yamagishi's Scale of Trust

Sawang 2010; Thailand	Un-known	The mediating and the moderating effect of perceived managerial support on role stressors and psychological outcomes were tested.	Cross-sectional study	After contacting entrepreneurs by letter and/or telephone and after permission to collect data, questionnaires were posted to organizations with pre-paid return envelops.	13 small manufacturing firms n=380; C. Manufacturing	3. Social relations: managers	Psychological strain; job satisfaction	<p><u>Psychological strain</u><sup>1</sup>: 12 items of the General Health Questionnaire (GHQ)</p> <p><u>Job satisfaction</u><sup>1</sup>: Minnesota Satisfaction Questionnaire (MSQ) short version by Weiss et al. (1967)</p> <p><u>perceived managerial support</u><sup>2</sup>: short version of the Survey of Perceived Organizational Support (SPOS) by Rhoades and Eisenberger (2002)</p> <p><u>role stressors</u><sup>2</sup>: The 14-item scale measures role ambiguity and role</p>
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conflict (Rizzo et al. 1970).

Baillien et al. 2011; Belgium	2005	Organizational correlates of workplace bullying in SMEs were examined.	Cross-sectional study	Questionnaires were sent to businesses after contacting the organization's manager and asked for their cooperation.	39 SMEs <100 employees n=358; no sector reported	1. Work content and task: emotional demands 3. Social relations: colleagues; managers	Bullying at work	<u>Bullying at work</u> <sup>1</sup> : Negative Acts Questionnaire (NAQ) <u>Organizational characteristics</u> <sup>2</sup> : Self-developed questionnaire with four validated scales
Sonnentag et al. 2012; Germany	Un-known	It was examined whether role breadth self-efficacy is the underlying mechanism of the positive relationship of job stressors and job control with proactive behavior, and whether supervisor-rated proactive behavior is as positively related to job	Cross-sectional study	After having received the CEOs' consent, paper-and-pencil questionnaires were sent to the participants (one each for the participant and the direct supervisor).	Small and medium-sized companies; n=140; C. Manufacturing	1. Work content and task: freedom of action; information/supply of information 2. Organization of work: working time; work process 4. Working environment: work equipment	Proactive work behavior	<u>Proactive behavior</u> <sup>1</sup> : supervisor-rated proactive behavior and personal initiative with the seven-item scale by Frese et al. (1997). <u>Taking charge</u> <sup>2</sup> : six items from the measure developed by Morrison and Phelps (1999) <u>Role breadth self-efficacy</u> <sup>2</sup> : nine items from the measure developed by Parker (1998)

stressors as proactive behavior itself.

Work characteristics<sup>2</sup>: (job control and job stressors) self-report scales developed by Semmer, Zapf, and Dunckel (1999)

Nakata 2012; 2002 Japan	2002	The associations between work hours, sleep status and self-reported health, among full-time employees, was investigated.	Cross-sectional study	After agreement of the companies, questionnaires were distributed to all employees during site visits.	296 SMEs; 1-158 employees; n=2884; C. Manufacturing	1. Work content and task: freedom of action; qualification 2. Organization of work: work process; communication/ cooperation 3. Social relations: colleagues; managers	Self-rated health (SRH)	<u>SRH<sup>1</sup></u> : one question: How would you describe your health during the past 1-year period? (very good / good / poor / very poor) <u>Daily sleep hours and subjective sleep sufficiency<sup>2</sup></u> : two self-developed items <u>Work hours<sup>2</sup></u> : assessed by an open-ended question (self-developed)
Cocker et al. 2013; Australia	Un-known	The prevalence of high/very high psychological distress, past-month sickness	Cross-sectional study	Baseline data from the evaluation of the Business in Mind program, a	Managers of SMEs < 200 employees n=217; several industrial sectors	1. Work content and task: Responsibility; 2. Organization of work: working time; 3. Social relations (not further differentiated)	Main outcomes: absenteeism; presentism; Conscientiousness; productivity loss ( the	<u>Interview survey, not specified<sup>1,2</sup></u> <u>absenteeism days<sup>1</sup></u> : one item from the World Health Organizations

absenteeism and presentism days in SME owner/managers were investigated. In addition, the associated, self-reported lost productivity and the associations between work, non-work and business-specific factors and work attendance behaviors were examined.

mental health promotion intervention amongst SME owner/managers were used. The method of data collection is not described, but questionnaires seem to have been used.

percentage of time SME owner/managers thought they were as productive as usual when they continued to work during illness)

Minor outcome: psychological distress;

Health and Work Performance Questionnaires (HPQ)  
Presentism<sup>1</sup>:  
item: "How many days in the last 4 weeks did you get to work while suffering from health problems?"

Lost productive time<sup>1</sup>:  
item: "On these days, when you went to work suffering from health problems, what percentage of your time were you as productive as usual?"

Conscientiousness<sup>1</sup>:  
five-item measure from the NEO Personality Inventory-Revised (NEO-PI-R)  
Psychological distress<sup>2</sup>:

Kessler (K10)  
Screening Scale for  
Psychological  
Distress  
Health related  
factors<sup>2</sup>:  
*general self-rated  
health was  
assessed by the  
first item of the SF-  
12, Treatment was  
measured by  
participant  
responses  
regarding the  
receipt of  
professional  
medical help for a  
mental health  
concern in the three  
months prior to the  
survey.*  
Work related well-  
being factors<sup>2</sup>:  
*Business  
confidence was  
measured by one-  
item measure; Job  
satisfaction was  
assessed by a 3-  
item measure;  
Work/life balance*

was determined by a 4-item measure.  
Business characteristics<sup>2</sup>:  
 one item each for number of employees supervised, number of employees in organization, work hours

Kottwitz et al. 2014; Switzerland	Un-known	The prevalence of work-related stressors and the association with blood pressure were investigated across one week of intense work.	Cross-sectional study	Work characteristics were assessed by questionnaire at the beginning of the study, after that the employees participated in repeated outpatient blood pressure measurements over one week.	Complete staff of a small enterprise n=7; J. Information and communication	2. Organization of work: work process; 3 Social relations (not further differentiated)	Increased blood pressure	24h-automatically recorded blood pressure <sup>1</sup>  <u>Time pressure<sup>2</sup></u> : a short self-report version of the Instrument for Stress Oriented Task Analysis <u>Social stressors<sup>2</sup></u> : 8-item scale developed by Frese and Zapf
Lai et al. 2015;	2011-2012	Employees' experience of work-stress	Cross-sectional study	A matched dataset of the Workplace	470 SMEs n=2250; several industrial sectors	1. Work content and task: freedom of action; 3. Social relations:	Employees' experience of	<u>Employees' experience of overall job stress<sup>1</sup></u>

United Kingdom		was examined in relation to firm size.		Employment Relations Survey 2011, a national work-place survey in United Kingdom, was used.		Managers; 5. New forms of work	overall job stress	constructed scale of six items of Workplace Employment Relations Survey 2011 (WERS2011) <u>Job stressors</u> <sup>1</sup> : scales were developed from WERS 2011, adopted to the "An Organizational Stress Screening Tool" (ASSET) Questionnaire
Rahman et al. 2014; Malaysia	Un-known	The factors of the relationship between performance enhancement and developing training needs of SME-employees and occupational stress were identified.	Cross-sectional study	An unspecified pilot-tested questionnaire was used. It was not clearly described if the questionnaire was self-developed or how it was distributed.	SMEs in Melaka; n=180; no sector reported	1. Work content and task: responsibility; qualification; 2. Organization of work: working time; work process; communication/cooperation; 3. Social relations: colleagues; managers; 4. Working environment: physical factors	Training needs; performance enhancement	Self-administered, pilot tested questionnaire, unspecified <sup>1,2</sup>

Mihic et al. 2015; Serbia	2012	Owners' perception of stress, caused by flexible working times and high levels of responsibility and the influence of family member employees on the entrepreneurial success was investigated.	Cross-sectional study	A self-developed questionnaire was used in a nationwide survey of owners of family-owned businesses.	Micro-enterprises and SMEs; n=2206; C. Manufacturing; S. Other service activities (not specified)	1. Work content and task: freedom of action; responsibility; 2. Organization of work: working time; 3 Social relations (not further differentiated)	Psychological pressure; success in a family firm;	Self-developed survey, containing 22 questions, generated from a theoretical research of the field of study <sup>1,2</sup>
Magnavita 2015; Italy	Un-known	The association between psychological injury and metabolic syndrome (MES) was evaluated.	Cross-sectional study	As part of their routine medical examination at the workplace, employees completed a self-developed questionnaire containing the Psychological Injury Risk Indicator (PIRI) questionnaire. In addition, biological data	20 small companies; n=571 F. Construction G. Wholesale and retail trade repair of motor vehicles and motorcycles Q. Human health and social work activities	1. Work content and task: emotional demands	One metabolic syndrome component	<u>Metabolic syndrome components</u> ! <ul style="list-style-type: none"> <li>• central obesity (defined as BMI&gt;30 kg/m<sup>2</sup>, or increased waist circumference with ethnicity-specific values)</li> <li>• elevated triglyceride (TGs) level: &gt; 150 mg/dL (1.7 mmol/L) or specific treatment for this lipid abnormality</li> </ul>

were determined and a blood sample was taken.

- reduced HDL cholesterol (HDL-c):
  - < 40 mg/dL (1.03 mmol/L) in males, < 50 mg/dL (1.29 mmol/L) in females, or specific treatment for this lipid abnormality
  - high blood pressure (BP): systolic BP > 130 or diastolic BP > 85 mm Hg, or treatment of previously diagnosed hypertension
  - high fasting plasma glucose (FPG): >100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes

Psychological injury<sup>2</sup>:  
questionnaire,



including scales of the Psychological Injury Risk Indicator (PIRI), which was developed for the early detection of emerging psychological injuries among workers

Saleem et al. 2016; Pakistan	Un-known	To address employees' turnover among small and medium firms in Pakistan's service sector, the antecedents of work exhaustion and the missing linchpin were explored.	Cross-sectional study	A self-rated questionnaire was used to collect data for independent variables on the start of a bus trip from the employees of the bus companies, the same participants were asked to fill in the survey on mediator and dependent variables on the bus return.	5 bus services; 15-86 employees; n=281 several industrial sectors	1. Work content and task: freedom of action; responsibility; 2. Organization of work: working time; work process; 3. Social relations: Managers; 5. New forms of work	Dependent variable: turnover intention  Mediating variable: work exhaustion	Questionnaire, reported and validated by Sondhi et al. (2008) and Ahuja et al. (2007) (contains scales developed by Moore(2000) and Beehr (1976)) <sup>1,2</sup>
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Fernet et al. 2016; France	Un-known	The individual and contextual factors, that make small-to-medium enterprise owner-managers vulnerable for burnout, were investigated to gain a deeper understanding of their occupational stress.	Cross-sectional study	The multi-wave study collected data at four different times (T1-T4) over an eight-month period using a short phone questionnaire. Sociodemographic data and entrepreneurial orientation were initially collected (T1). Scales designed to assess job stressors related to SME management (T2), loneliness (T3), and burnout (T4) were asked afterwards.	Managers of SMEs, 3-250 employees n=377; no sector reported	1. Work content and task: Responsibility; 2. Organization of work: communication/ cooperation; 3. Social relations: colleagues	Burnout	<p><u>Burnout</u><sup>1</sup>: The French version of the Burnout Measure, Short Version (BMS)</p> <p><u>Job stressors related to SME management</u><sup>2</sup>: five items developed by Torres and Lechat (2012)</p> <p><u>Entrepreneurial orientation</u><sup>2</sup>: the 9-item scale developed by Covin and Slevin (1989)</p> <p><u>Occupational loneliness</u><sup>2</sup>: single item</p>
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Godin et al. 2017; Belgium	2012- 2015; 2015- 2016	The working conditions of entrepreneurs in very small companies were assessed. The impact of these conditions on their health and well-being as well as the interference with their private lives was investigated.	Cross-sectional study	One study used a combination of in-depth interviews, self-administered questionnaires, and on-site observation methodology, the other study included a survey made available online through the Brussels Enterprise Agency, Impulse, Brussels.	Entrepreneurs of SMEs (80% < 5 employees); compared to 104 small retailers n=140/ n=104; several industrial sectors	2. Organization of work: working time; work process; 3. Social relations: Colleagues; 5. New forms of work	Self-reported health ; well-being (self-reported); work-home interference importance of work	<u>2012-2015:</u> in-depth interviews, unspecified questionnaires, and on-site observation <sup>1,2</sup> <u>2015-2016:</u> survey, in both French and Dutch versions with multiple health indicators (self-reported) <sup>1,2</sup> <u>Subjective health status<sup>1</sup>:</u> a close-ended question in five categories clubbed into two groups ("good/very good" and "average/(very) bad") <u>Work-home interference<sup>1</sup>:</u> Kelloway's questionnaire <u>Importance of work<sup>1</sup>:</u> Mow's question on the centrality of work
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Isahak et al. 2014-2017; Malaysia, Indonesia, Thailand, Vietnam	2015	The study examined Quality of Life (QOL) among SME-workers in four Asian countries and the association of Workplace Exposures to the physical, psychological, social and environmental domain of QOL.	Cross-sectional study	An anonymous self-administered and self-designed questionnaire was distributed to workers and collected by researchers a few days later.	SMEs in Jakarta, Kuala Lumpur, Bangkok and Can Tho; n=2430, 500 from each country C. Manufacturing	2. Organization of work: working time; 4. Working environment: physiochemical factors; physical factors; 5. New forms of work	Quality of life (QOL) (physical domain, psychological domain, social domain, environmental domain)	<u>Quality of life<sup>1</sup></u> : The WHO quality of life assessment instrument (WHOQOL-Bref) <u>Chronic fatigue<sup>1</sup></u> : four questions proposed by Albert et al.'s chronic fatigue questionnaire <u>Sociodemographic factors and work characteristics; work environment and ergonomic conditions<sup>2</sup></u> : assessed in a self-designed survey
Lewis et al. 2017; United Kingdom	2008	By using data from a national survey, the study examined the relationship between work-related stressors and bullying and harassment in British SMEs.	Cross-sectional study	Data of a secondary self-completed survey of "The Fair Treatment at Work Survey" were used. After cleaning data, 1357 fully completed questionnaires for analysis in	SMEs (<250 employees) n=1357 several industrial sectors	1. Work content and task: emotional demands; 3. Social relations: colleagues; managers	Bullying at work; harassment	Secondary self-completion survey of 'The Fair Treatment at Work Survey' (two items asked whether respondents were subject to bullying and harassment at work <sup>1</sup> and 31 items represented work-related stressor

the SME category remained.

influences<sup>2</sup>, originated from the HSE's 'Management Standards' (2008))

Diaz-Chao et al. 2017; Spain	2008 – 2010	Analysis of the extent to which a set of related job quality dimensions, by enterprise-size class, have evolved between 2008 and 2010. Results were related to the recession.	Cross-sectional study	Data collection for Quality of Working Life Survey for 2008 and 2010 was done by means of computer-assisted telephone interviews or, if not possible by personal interviews.	SMEs< 250 employees (micro (n=1-10) small (n=11-50) medium (n=51-249) Sample: 2008: n=3138 2010: n=2917 A. Agriculture, forestry, fishing C. Manufacturing F. Construction Service (not specified))	1. Work content and task: freedom of action; variability; qualification; 2. Organization of work: working time; work process; 3. Social relations: colleagues; managers; 4. Working environment: physicochemical factors; workplace and information structure; 5. New forms of work	Job quality	Quality of Working Life Survey (ECVT, as abbreviated in Spanish) <sup>1,2</sup> for 2008 and 2010 (Statistical survey conducted by Spain's Ministry of Employment and Social Security)
Hildenbrand et al. 2018; Germany	Un-known	The correlation of transformational leadership to employee burnout was investigated by considering thriving at work (personal resource) and employees'	Cross-sectional study	A questionnaire as paper-and-pencil- or online version containing previously translated and validated scales (except for thriving) was used. The	One mid-sized company; n=148 C. Manufacturing	3. Social relations: managers	Burnout	<u>Burnout</u> <sup>1</sup> : The 16-item Oldenburg Burnout Inventory (Demerouti et al., 2003). <u>Thriving</u> <sup>2</sup> : The 10-item Thriving at Work Scale (Porath et al., 2011).

openness to experience (a key resource). The aim was to find out if all employees benefit in a similar way from transformational leadership.

items pertaining to thriving were translated using back-translating method. All questionnaires had to be completed within a week.

Supervisor's transformational leadership<sup>2</sup>: The 15-item German version of the Multifactor Leadership Questionnaire Form 5X-Short (MLQ)  
Openness to experience<sup>2</sup>: six bipolar adjective pairs from German short version MRS-30 of the MRS Inventory

Magnavita 2018; Italy	2015-2017	The study described a new way of proceeding with medical surveillance in an SME in Rome and reported the observations and the short-term results of a primary stress prevention intervention	Intervention study	Within medical examination in 2015 and 2017 the workers completed questionnaires containing the ERI questionnaire and Goldberg's Anxiety and Depression scale. In 2017 the workers	SME in Rome n=57 N. Administrative and support service activities	2. Organization of work: working time; work process; 3. Social relations: Managers; 5. new forms of work	Work-related stress; mental wellbeing (anxiety, depression)  (comparison before and after an intervention)	<u>Mental wellbeing<sup>1</sup></u> : Goldberg's Anxiety and Depression scale <u>Work-related stress<sup>1</sup></u> : The ERI questionnaire (the short, validated version in Italian)
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using participatory ergonomic groups ("Gruppo di Ergonomia Partecipativa", GEP©).

who had participated in the intervention were asked about the results.

Sommovigo et al. 2018; Italy and Ireland	2016-2017	In this study similarities and differences between Italian and Irish workers' well-being in relation to robberies and theft exposure were investigated by examining post-traumatic symptoms and trauma-related coping self-efficacy.	Cross-sectional study	A self-developed, anonymous self-reported paper-and-pencil- or online questionnaire was used to collect data. The questionnaire contained previously used scales for some variables.	Small businesses Italian n=319 Irish n= 251 G. Wholesale and retail trade repair of motor vehicles and motorcycles	1. Work content and task: emotional demands	Main outcome: post-traumatic stress disorder (PTSD)  Secondary outcome: coping Self-efficacy	<u>PTSD</u> <sup>1</sup> : The six-item Impact of Event-Revised scale (IES-R) <u>Coping self-efficacy</u> <sup>1</sup> : The seven-item trauma-related coping self-efficacy scale (CSE-7) <u>Robbery and/or theft exposure</u> <sup>2</sup> : two dichotomous items and a checklist, to investigate peri-trauma variables among victims of robberies at work, proposed by Giorgi et al. (2015)
Setti et al. 2018; Italy	Un-known	It was investigated to what extent	Cross-sectional study	Respondents filled in an anonymous	Small businesses n=492	1. Work content and task: emotional demands; 2. Organization of work:	Main outcome:	<u>General psychological health</u> <sup>1</sup> :

		workers' mental health, coping-self-efficacy, social support seeking, workload and job satisfaction was affected by experiencing robberies and/or thefts at work.		self-report questionnaire, containing previously used and validated scales; victims of violence answered additional questions related to post-traumatic stress symptomatology, trauma related coping self-efficacy and use of mental health services.	G. Wholesale and retail trade repair of motor vehicles and motorcycles I. Accommodation and food service activities	work process	general psychological health  Secondary outcomes: post-traumatic stress-symptoms; coping self-efficacy; social support seeking; job satisfaction; work load	General Health Questionnaire (GHQ-12) <u>Post-traumatic stress symptoms<sup>1</sup></u> : The six-item Impact of Event-Revised scale (IES-R) <u>Trauma-related coping self-efficacy (CSE)<sup>1</sup></u> : Seven-item Coping self-efficacy scale (CSE-7) <u>Social support seeking<sup>2</sup></u> : Coping Orientation to Problem Experienced scale, COPE-IV <u>Job satisfaction<sup>2</sup></u> : single item <u>Workload<sup>2</sup></u> : subscale taken from the Areas of Work life Survey	
Magola et al. 2015-2018; United Kingdom	2015-2016	The aim was to identify the challenges and their relative importance, novice	Qualitative study	The nominal group technique (NGT), a data collection method which	Novice community pharmacists' (NCPs); independent practitioner n=25 Q. Human health and social work activities		1. Work content and task: responsibility; qualification; 2. Organization of work: communication/ cooperation; 3. Social relations: colleagues	No outcome predefined	Nominal group technique (NGT) developed by Delbecq <sup>1,2</sup>



community pharmacists' (NCPs) are faced at transition to independent practitioners.

used group discussion, was used to identify the challenges faced by NCPs as they transition to independent.

Yeh et al. 2018; Taiwan	2013	Employees' work stress, well-being and burnout in a newly industrialized country were investigated with regard to public-private and company size differences.	Cross-sectional study	Data of a national employee survey, conducted in 2013 by the Institute of Labor, Occupational Safety and Health (ILOSH) of the Taiwan government, was used for analysis.	Private SMEs < 200 employees n=10319; C. Manufacturing; F. Construction; D. electricity, gas; Service (not specified), several other sectors (1,2%)	1. Work content and task: freedom of action; 2. Organization of work: working time; 5. New forms of work	Burnout	<u>Burnout</u> <sup>1</sup> : Chinese version of the Copenhagen Burnout Inventory (C-CBI) <u>Job characteristics</u> <sup>2</sup> : Chinese version of Job Content Questionnaire (C-JCQ) <u>Job instability</u> <sup>2</sup> : four subjective and objective indicators (questions)
Rastogi et al. 2018; India	Un-known	The two alternative theoretical explanations of disengagement at work were tested: the	Cross-sectional study	A self-developed and translated survey, containing previously used scales	Agro-processing unit 138 employees n=119; C. Manufacturing	1. Work content and task Variability; 2. Organization of work: work process	Main outcome: disengagement  Secondary outcomes: work exhaustion;	<u>Disengagement</u> <sup>1</sup> : five items from the disengagement subscale of the Oldenburg Burnout Inventory (OLBI)

relationship between job complexity and disengagement (according to job-demands-resources (JD-R) perspective) and the relationship between exhaustion and disengagement (according to the process model of burnout). Also, the mediating role of Resilience (referring to the conservation of resources (COR) as an integrative framework) on both these relationships was examined.

for some variables, was used for investigation.

resilience;  
job complexity

(Demerouti et al., 2001)  
Exhaustion<sup>1</sup>:  
four items from the exhaustion subscale of the OLBI  
Resilience<sup>1</sup>:  
five items from Smith et al. (2008)  
Job complexity<sup>1</sup>:  
three items from Shaw and Gupta (2004)

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Estévez-Mujica et al. 2018;	2018	The aim of this study was to identify	Cross-sectional study	Burnout data was collected via an online-	Medium-sized company;2012 employees n=57;	1. Work content and task: information/ supply of information;	Dependent variable: burnout;	<u>Burnout</u> <sup>1</sup> :
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Italy	employees at risk of job burnout, in an innovative way, by analyzing the e-mail communication patterns.	survey. All internal company e-mail data (communications between company employees) were collected over a five-month period and analyzed.	M. Professional, scientific and technical activities	2. Organization of work: work process; communication/cooperation; 3. Social relations: colleagues	Independent variables: e-mail communication patterns: 1. volume variables 2. behavioral variables 3. positional variables	online version of the OLBI questionnaire <u>E-volume variables</u> ': the sum of all e-mails sent or received; the average daily number of e-mails sent or received over the period of analysis; the total volume of e-mails sent or received, compared to a hierarchical level baseline; email bursts (sequence of e-mails that occurs within a specific time threshold between each e-mail) <u>Positional variables</u> ': UCINET's ego network unweighted basic measures procedure and UCINET's ego
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networks structural  
holes procedure  
Behavioral  
variables<sup>1</sup>:  
Ratio  
Sent/Received; E-  
mails Sent During  
Out-of-office Hours;  
Higher Hierarchical  
Level Reciprocity  
Control variables<sup>2</sup>:  
self-developed  
online  
questionnaire

Encrenaz et al. 2019; France	2010	The differences between enterprise sizes in relation to the psychosocial work environment and psychological health was examined. The mediating role of perceived working conditions on anxious or depressive	Cross-sectional study	Data from a French periodical cross-sectional survey (2010 SUMER) were analyzed.	SMEs <250 employees; 73,2% of 31420 ≈ n= 23000; private companies, economic sector not reported	1. Work content and task: freedom of action; variability; 2. Organization of work: work process; 3. Social relations: managers	Depressive episodes; anxious episodes;	<u>Depressive and anxious episodes<sup>1</sup></u> : Hospital anxiety and depression scale (HADS) <u>Perceived working conditions<sup>2</sup></u> : French version of Job Content Questionnaire (JCQ)
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episodes was tested.

Voss et al 2019; Germany	(1) 2016– 2017 (2) 2018	The study assessed the accessibility and expected availability of workers in SMEs in order to identify starting points for workplace health management to improve the way these aspects are dealt with.	Two cross-sectional studies	Data from two surveys (2016/2017 and 2018) were analyzed using a self-developed questionnaire which was enhanced for the second survey.	(1) 11 SMEs; (2) 1 SME (1) n= 1198 (2) n= 138; several economic sectors	5. New forms of work	Psychological stress due to permanent availability;  Secondary outcomes: frequency of contacts; expectations for replying	Self-developed questionnaire <sup>1,2</sup>
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**Table 12** Critical appraisal of cross-sectional studies, using the SURE checklist (SURE 2018a)

Meaning of colors: green= positive rating, yellow= medium rating, orange=suboptimal rating, white=neutral rating

1.Studies : Myers and Myers (2004) – Rau et al. (2008)

Study Checklist questions	Myers and Myers 2004	Agervold et al. 2004	Bennett et al. 2006	Gardner and Hini 2006	Nakata et al. 2006	Nakata et al. 2007	Tsai et al. 2007	Berthelsen et al. 2008	Rau et al. 2008
Are there other companion papers from the same study?	no	secondary data, but no other study referred.	yes, Data from the Harvard Cancer Prevention Program Project - Healthy Directions Study; Hunt et al. (2003)	yes, data of first analysis were reported in 2001 and 2005 and publicized in VetScript	yes	yes	no	no	no
1. Is the study design clearly stated?	yes	yes, good theoretical Design of Hypothesis,	yes, but usage of secondary data	yes	yes	yes	yes	yes	yes
2. Does the study address a clearly focused question? Consider: Population; Exposure; (defined and accurately measured?); outcomes.	yes	yes, clearly described Study questions; 93% participated, except holiday and sick leave --> risk of healthy worker bias	yes; but few reporting of theoretical background. No hypothesis stated	yes	yes	yes	yes	yes	yes
3. Are the setting, locations and relevant dates provided? Consider: recruitment period; exposure; data collection.	yes	yes/no: no recruitment/data collection period provided, data collection for all participants in working hours;	no, but reference to original study	yes	yes	yes	yes	yes	yes
4. Were participants fairly selected? Consider: eligibility criteria; sources & selection of participants.	yes	yes; all workers were selected; extent sick leave;	yes, but risk of healthy workers bias	yes	yes	yes	yes	yes	yes

Study	Myers and Myers 2004	Agervold et al. 2004	Bennett et al. 2006	Gardner and Hini 2006	Nakata et al. 2006	Nakata et al. 2007	Tsai et al. 2007	Berthelsen et al. 2008	Rau et al. 2008
Checklist questions									
5. Are participant characteristics provided? Consider if: sufficient details; a table is included.	yes	yes; good description but no table	no, insufficient reporting of study group specifics	yes	yes	yes	no	yes	yes
6. Are the measures of exposures & outcomes appropriate? Consider if the methods or assessment are valid & reliable.	yes	yes; PWSQ good reliability and good validity (tested in other study);	yes outcome, no exposure (no validation of modified questionnaire reported)	no reporting of validity /reliability of questionnaire	yes	yes	yes	unclear, no validity and no reliability reported	yes
7. Is there a description of how the study size was arrived at?	no	only one firm was measured, no preliminary estimate of study size	no, only one enterprise	no	no, survey data	no, survey data	no	no	no
8. Are the statistical methods well described? Consider: How missing data was handled; were potential sources of bias (confounding factors) considered/controlled for.	no	no; only method named	yes	yes	yes	yes	no	yes	yes/no
9. Is information provided on participant eligibility? Consider if following provided: number potentially eligible, confirmed eligible, entered into study.	yes	yes	yes	yes	yes	yes	no	yes	yes

Addendum: Meaning of colors: green= positive rating, yellow= medium rating, orange=suboptimal rating, white=neutral rating

Study	Myers and Myers 2004	Agervold et al. 2004	Bennett et al. 2006	Gardner and Hini 2006	Nakata et al. 2006	Nakata et al. 2007	Tsai et al. 2007	Berthelsen et al. 2008	Rau et al. 2008
Checklist questions									
10. Are the results well described? Consider if: effect sizes, confidence intervals/standard deviations provided; the conclusions are the same in the abstract and the full text.	yes	no	yes	yes	yes	yes	yes	yes	yes
11. Is any sponsorship/conflict of interest reported?	yes	yes	no	yes	yes	yes	yes	yes	no
12. Did the authors identify any limitations and, if so, are they captured above?	yes reported, not captured	yes reported, not captured	yes	yes	yes	yes	yes	no	yes
Summary: Add comments relating to areas of concern that were avoidable and a statement indicating if the results are reliable and/or useful.	Only limited representative of SME (NHS system), limited statistical reporting, no differentiated evaluation of various subgroups (e.g., men and women).	Date of data collection is not provided, Statistical procedures are not described well. Good reliability, limited internal and external validity. Detailed description of variables measured. Theme is relevant for review question.	companies with multi-ethnic population. Of 103 companies only 26 participated. Limited extent of SME-employees. Limited external and internal validity, low internal reliability	no questionnaire reliability reported; special sample	well reported study, big study population, very important question	well reported study, big study population, interesting issue	really hard to understand, not well described if hypothesis were accepted.	no limitations reported, Questionnaire validity and reliability not reported but tested; statistics well done and sample well reported .	limited informative value, no confounder defined, no reliability/validity of assessments reported but often used questionnaires were used.



2. Studies : Ikeda et al. (2002) – Nakata et al. (2012)

Study									
Checklist questions	Ikeda et al. 2009	Villanueva and Djurkovic 2009	Wang et al. 2009	2010 Nakata	Rhee 2010	Sawang 2010	Baillien et al. 2011	Sonnentag and Spsychala 2012	Nakata 2012
Are there other companion papers from the same study?	yes	no	no	yes	no	no	no	no	yes
1. Is the study design clearly stated?	yes	yes	yes	yes	yes	yes	yes	yes	yes
2. Does the study address a clearly focused question? Consider: Population; Exposure; (defined and accurately measured?); outcomes.	yes	yes	yes	yes	yes	yes	yes	yes	yes
3. Are the setting, locations and relevant dates provided? Consider: recruitment period; exposure; data collection.	yes	yes (date of data collection not reported)	yes	yes	yes	yes, no date of data collection	yes	yes	yes
4. Were participants fairly selected? Consider: eligibility criteria; sources & selection of participants.	yes	yes	yes	yes	yes	yes	no/unclear	yes	yes
5. Are participant characteristics provided? Consider if: sufficient details; a table is included.	yes	no table	yes	yes	yes	yes/no table	yes	yes	yes
6. Are the measures of exposures & outcomes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Study									
Checklist questions	Ikeda et al. 2009	Villanueva and Djurkovic 2009	Wang et al. 2009	2010 Nakata	Rhee 2010	Sawang 2010	Baillien et al. 2011	Sonnentag and Spychala 2012	Nakata 2012
appropriate? Consider if the methods or assessment are valid & reliable.									
7. Is there a description of how the study size was arrived at?	no	no	no	no	no	no	no	no	no
8. Are the statistical methods well described? Consider: How missing data was handled; were potential sources of bias (confounding factors) considered/controlled for.	yes/no	yes	yes	yes	yes	yes	yes	yes	yes
9. Is information provided on participant eligibility? Consider if following provided: number potentially eligible, confirmed eligible, entered into study.	yes	yes	yes	yes	no	yes	yes	yes	yes
10. Are the results well described? Consider if: effect sizes, confidence intervals/standard deviations provided; the conclusions are the same in the abstract and the full text.	yes	yes	yes	yes	yes	yes	yes	yes	yes

Study	Ikeda et al. 2009	Villanueva and Djurkovic 2009	Wang et al. 2009	2010 Nakata	Rhee 2010	Sawang 2010	Baillien et al. 2011	Sonnentag and Spychala 2012	Nakata 2012
Checklist questions									
11. Is any sponsorship/conflict of interest reported?	yes	no	yes	no	no	yes	no	yes	no
12. Did the authors identify any limitations and, if so, are they captured above?	no	yes	yes	yes	yes	yes	yes	yes	yes
Summary: Add comments relating to areas of concern that were avoidable and a statement indicating if the results are reliable and/or useful.	limitations not reported, statistical analyses only short reported, interesting issue, nice study population; valuable study	Well reported study, date of data collection not reported.	Well reported study, not clear how working conditions in SMEs in Taiwan differ from those in Europe.	Well reported study, big study group, randomly selected.	Influence of trust on work stress is only a small part of organizational culture. Generalization not possible because of limited number of subjects and level of analyzes.	population not well reported, although all else well reported. Describes "trust" in a comprehensive way. Good value by clarifying an unclear model of support.	high value, also policy recommendations reported, good method reporting, neg: recruiting and questionnaire-handling not reported	Well reported study, little bias.	no special SME-question, would be interesting comparing working hours to big enterprises

Addendum: Meaning of colors: green= positive rating, yellow= medium rating, orange=suboptimal rating, white=neutral rating

3.Studies : Cocker at al. (2013) – Godin et al. (2017)

Study	Cocker et al. 2013	Kottwitz et al. 2014	Rahman et al. 2014	Lai et al. 2015	Mihic et al. 2015	Magnavita 2015	Saleem et al. 2016	Fernet et al. 2016	Godin et al. 2017
Checklist questions									
Are there other companion papers from the same study?	yes	no	no	no	no	no	no	no	unclear
1. Is the study design clearly stated?	yes	yes	yes	yes	yes	yes	yes	yes	yes
2. Does the study address a clearly focused question? Consider: Population; Exposure; (defined and accurately measured?); outcomes.	yes	yes	yes	yes	yes	yes	yes	yes	yes
3. Are the setting, locations and relevant dates provided? Consider: recruitment period; exposure; data collection.	yes	yes	no	yes	yes	yes/no	yes	yes/no	yes
4. Were participants fairly selected? Consider: eligibility criteria; sources & selection of participants.	no	yes	no	yes	yes	yes	yes	yes	no
5. Are participant characteristics provided? Consider if: sufficient details; a table is included.	yes	yes	yes	yes	y/n firm characteristics/ not person characteristics	yes	yes	no	yes
6. Are the measures of exposures & outcomes	yes	yes	yes	yes	process validity is	yes	yes	yes	(no) - questionnaire

Study	Cocker et al. 2013	Kottwitz et al. 2014	Rahman et al. 2014	Lai et al. 2015	Mihic et al. 2015	Magnavita 2015	Saleem et al. 2016	Fernet et al. 2016	Godin et al. 2017
appropriate? Consider if the methods or assessment are valid & reliable.					tested, no validity /reliability of assessment is reported				developed of scales from other questionnaires, no reliability/ validity reported
7. Is there a description of how the study size was arrived at?	no	no	no	no	yes	yes	no	no	not possible to calculate
8. Are the statistical methods well described? Consider: How missing data was handled; were potential sources of bias (confounding factors) considered/controlled for.	no	yes	yes	yes	yes	yes	yes	yes	yes
9. Is information provided on participant eligibility? Consider if following provided: number potentially eligible, confirmed eligible, entered into study.	yes	yes	no	yes	yes	yes	yes	yes	not possible to calculate due to voluntary online questionnaire
10. Are the results well described? Consider if: effect sizes, confidence intervals/standard deviations provided; the	yes	yes	yes	yes	yes	yes	yes	yes	yes

Study	Cocker et al. 2013	Kottwitz et al. 2014	Rahman et al. 2014	Lai et al. 2015	Mihic et al. 2015	Magnavita 2015	Saleem et al. 2016	Fernet et al. 2016	Godin et al. 2017
conclusions are the same in the abstract and the full text.									
11. Is any sponsorship/conflict of interest reported?	yes	no	no	no	no	no	no	yes	yes
12. Did the authors identify any limitations and, if so, are they captured above?	yes	yes	no	no	yes, partly	yes	yes	yes	yes
Summary: Add comments relating to areas of concern that were avoidable and a statement indicating if the results are reliable and/or useful.	main subject are managers of SMEs, not representative for all workers in SMEs and for SMES in Australia, selection bias because participants of a project	well done study, "hard" outcome measured, ne.: <u>small study group, not representative</u>	not described, how participants were selected	differences of small and big firms are investigated, data of a nationwide survey is used --> representative (WERS)	only entrepreneurs, not employees tested;	small study group but statistical power was calculated. Date of data collection not clearly stated	Date of data collection not clearly stated	only entrepreneurs, not employees	Entrepreneurs high risk of bias due to study design

Addendum: Meaning of colors: green= positive rating, yellow= medium rating, orange=suboptimal rating, white=neutral rating

4. Studies: Lewis et al. (2017) – Voss (2019)

Study	Lewis et al. 2017	Díaz-Chao et al. 2017	Hildenbrand et al. 2018	Sommovigo et al. 2018	Encrenaz et al. 2019	Setti et al. 2018	Yeh et al. 2018	Rastogi et al. 2018	Estévez-Mujica and Quintane 2018	Voss and Drexler 2019
Checklist questions										
Are there other companion papers from the same study?	another study reported the primary data of the used national survey	no	no	yes, see Setti	unclear (national survey)	yes	unclear (national survey)	unclear	no	no
1. Is the study design clearly stated?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2. Does the study address a clearly focused question? Consider: Population; Exposure; (defined and accurately measured?); outcomes.	yes,	yes	yes	yes	yes	yes	yes	yes	yes	yes
3. Are the setting, locations and relevant dates provided? Consider: recruitment period; exposure; data collection.	yes, clearly stated, using data from a hitherto not reported questionnaire	yes	yes	yes	yes	yes	yes	yes	yes	yes
4. Were participants fairly selected? Consider: eligibility criteria; sources & selection of participants.	yes	yes	yes	yes	unclear	yes	yes	yes	yes	unclear
5. Are participant characteristics provided? Consider if:	yes	no	yes	yes	yes	yes	yes	yes/no	no/ not relevant	yes

Study	Lewis et al. 2017	Díaz-Chao et al. 2017	Hildenbrand et al. 2018	Sommovigo et al. 2018	Encrenaz et al. 2019	Setti et al. 2018	Yeh et al. 2018	Rastogi et al. 2018	Estévez-Mujica and Quintane 2018	Voss and Drexler 2019
Checklist questions										
sufficient details; a table is included.										
6. Are the measures of exposures & outcomes appropriate? Consider if the methods or assessment are valid & reliable.	yes	yes	yes	yes	yes	yes	yes	yes	yes	unclear
7. Is there a description of how the study size was arrived at?	no	yes	yes	no	yes	no	yes	no	yes	no
8. Are the statistical methods well described? Consider: How missing data was handled; were potential sources of bias (confounding factors) considered/controlled for.	yes	yes	yes	yes	yes	yes	yes	yes	yes	no, (only descriptive statistics)
9. Is information provided on participant eligibility? Consider if following provided: number potentially eligible, confirmed eligible, entered into study.	yes (secondary data)	no	yes	no	no	no	yes	yes	yes	yes



Study	Lewis et al. 2017	Díaz-Chao et al. 2017	Hildenbrand et al. 2018	Sommovigo et al. 2018	Encrenaz et al. 2019	Setti et al. 2018	Yeh et al. 2018	Rastogi et al. 2018	Estévez-Mujica and Quintane 2018	Voss and Drexler 2019
Checklist questions										
10. Are the results well described? Consider if: effect sizes, confidence intervals/standard deviations provided; the conclusions are the same in the abstract and the full text.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
11. Is any sponsorship/conflict of interest reported?	no	no	no	no	yes	no	yes	yes	no	no
12. Did the authors identify any limitations and, if so, are they captured above?	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
Summary: Add comments relating to areas of concern that were avoidable and a statement indicating if the results are reliable and/or useful.	Relevant study for research question, bullying in the special context of SMES. Representative data, good quality, but secondary data.	differences of SMEs and large firms,	investigating the relationship of leadership and personal characteristic,	cultural differences in coping-self-efficacy	differences of SEMs and large enterprises	Probably publication to one of the data sets (Italian) of Sommovigo et al.	differences between public sector, private SMEs und Private LE, in Taiwan,	only one SME investigated	measurement of email-communication-patterns, only one SME	small number of participants, statistical analysis impossible

Addendum: Meaning of colors: green= positive rating, yellow= medium rating, orange=suboptimal rating, white=neutral rating

## Table 13 Search strategy for PubMed<sup>+</sup>

### Addendum:

+ The search strategy for PubMed was previously published in: Schreibauer et al. (2020)

Search	Query
#14	Search (#10) AND #11 Filters: Publication date from 2000/01/01
#12	Search (#10) AND #11
#11 SME	Search ("Small Business"[Mesh]) OR (((small[Tw] OR small-medium[Tw] OR small-scale[Tw] OR medium[Tw] OR medium-sized[Tw] OR medium sized[Tw] OR mediumsized[Tw] OR midsized[Tw] OR mid-sized[Tw] OR midsi*[Tw]) AND (enterprise[Tw] OR enterprises[Tw] OR enterpri*[Tw] OR busines*[Tw] OR business[Tw] OR businesses[Tw] OR company[Tw] OR companies[Tw] OR workplace[Tw] OR workplaces[Tw])) OR "small & medium-sized business"[Tw] OR "small & medium-sized businesses"[Tw] OR Microenterprise*[Tw] OR "Kleine und mittlere Unternehmen"[Tw] OR "kleine und mittelstaendische Unternehmen"[Tw] OR "KMU"[Tw] OR "KMUs"[Tw] OR "Kleine Unternehmen"[Tw] OR "Mittlere Unternehmen"[Tw] OR "Kleine und mittlere Betriebe"[Tw] OR "Klein- und Mittelbetriebe"[Tw] OR "KMB"[Tw] OR "Klein- und Mittelunternehmen"[Tw] OR "kleine und mittelgrosse Unternehmen"[Tw] OR "Kleinstunternehmen"[Tw] OR SME[Tw] OR SMEs[Tw])
#10	Search (#9 OR #8)
#9	Search (((#1 OR #3 OR #4 OR #5 OR #6 OR #7))) AND #8
#8 stress terms	Search ("Psychology, Industrial"[Mesh] OR "Occupational Stress"[Mesh] OR "Stress, Psychological"[Mesh] OR "Burnout, Psychological"[Mesh] OR "Burnout, Professional"[Mesh]) OR (Burnout[Tw] OR "job stress"[Tw] OR ((job*[Tw] OR work*[Tw] OR task*[Tw]) AND stress*[Tw]) OR "work stress"[Tw] OR (stress[Tw] AND psychological[Tw]) OR "psychological stress"[Tw] OR "work-related psychological stress"[Tw] OR "mental stress"[Tw] OR "mental strain"[Tw] OR "psychological strain"[Tw] OR "work related stress"[Tw] OR "work-related stress"[Tw] OR stress[Tw] OR strain*[Tw] OR stressor*[Tw] OR "occupational stressor"[Tw] OR "occupational stressors"[Tw])
#7 new forms of work	Search ("occupational mobility"[Tw] OR "Job Mobility"[Tw] OR (Mobility[Tw] AND Occupational[Tw]) OR "spatial mobility"[Tw] OR commuting[Tw] OR commuters[Tw] OR transportation[Tw] OR (work[Tw] AND travel*[Tw]) OR (business[Tw] AND travel[Tw]) OR (sale*[Tw] AND force*[Tw]) OR "field service"[Tw] OR overnigher[Tw] OR "mobile worker"[Tw] OR "mobile workers"[Tw] OR "adaptability personality"[Tw] OR "Life-Work Imbalance"[Tw] OR "work-life balance"[Tw] OR "work-life-balance"[Tw] OR "on-call work"[Tw] OR "job insecurity"[Tw] OR "job security"[Tw] OR "employment uncertainty"[Tw] OR "job uncertainty"[Tw] OR "flexible work arrangements"[Tw] OR "flexible work arrangement"[Tw] OR "atypical employment"[Tw] OR "flexible employment"[Tw] OR "alternative employment"[Tw] OR "flexible employment"[Tw] OR contract[Tw] OR "temporary work"[Tw] OR "temporary employment"[Tw] OR flexicurity[Tw] OR "flexible workers"[Tw] OR "nonstandard work"[Tw] Search (OR "substandard job"[Tw] OR "substandard jobs"[Tw] OR "nonstandard employment"[Tw] OR "workplace restructuring"[Tw] OR "part-time job"[Tw] OR "part-time jobs"[Tw] OR "part-time-job"[Tw] OR "labor market segmentation"[Tw] OR "temporary work"[Tw] OR "workfamily-border"[Tw] OR "work-home border"[Tw] OR "border theory"[Tw] OR "boundary flexibility"[Tw] OR "boundary management"[Tw] OR "boundary spanning"[Tw] OR "boundary strategies"[Tw] OR "boundary strength"[Tw] OR "workfamily-border"[Tw] OR "work-home border"[Tw] OR dislimitation[Tw] OR permeability[Tw] OR segmentation[Tw] OR "remote work"[Tw] OR "telework"[Tw] OR "working at home"[Tw] OR "work at home"[Tw])) OR "flexible work arrangements"[Tw] OR (flexible[Tw] AND employ*[Tw]) OR (flexib*[Tw] AND employment[Tw] AND contract*[Tw]) OR "flexible employment contracts"[Tw] OR "flexible employment contract"[Tw] OR "flexible work contract"[Tw] OR "flexible work contracts"[Tw] OR (contingent[Tw] AND (employ*[Tw] OR work*[Tw])) OR ((atypic*[Tw] OR non-standard[Tw] OR nonstandard[Tw] OR non-regular[Tw] OR nonregular[Tw] OR non-permanent[Tw] OR nonpermanent[Tw] OR nontraditional[Tw] OR precarius[Tw] OR unstable[Tw] OR unstabel[Tw] OR casual[Tw] OR seasonal[Tw]) AND (work*[Tw] OR employ*[Tw])) OR "nontraditional occupation"[Tw] OR ((employment OR work) AND (type*[Tw] OR contract*[Tw])) OR (temporary employment agenc*[Tw] OR (temporary employ*[Tw] OR (temporary work*[Tw] OR (agency work*[Tw] OR (multiple employ*[Tw] OR (multiple[Tw] AND job[Tw] AND hold*[Tw]) OR

(multiple[Tw] OR single[Tw]) AND jobholder\*[Tw]) OR (moonlighting[Tw] AND work[Tw]) OR (marginal employ\*[Tw] OR (short-term contract\*[Tw] OR ((short-term[Tw] OR fixed-term[Tw] OR seasonal[tw] OR casual[tw]) AND (work\*[Tw] OR contract\*[Tw] OR employ\*[Tw])) OR "fixed-term contract"[Tw] OR (fixed-term[tw] AND employ\*[tw])[Tw] OR (temporary\*[tw] AND work contract\*[tw]) OR "part-time staff"[Tw] OR part-time employ\*[Tw] OR part-time work\*[Tw] OR self-employment[Tw] OR "independent contractors"[Tw] OR "independent contractor"[Tw] OR freelancer\*[Tw] OR sole trader\*[Tw] OR contract work\*[Tw] OR "seasonal occupation"[Tw] OR (multiple job\*[Tw])) OR ((job-family[Tw] AND relationship\*[Tw]) OR (job[Tw] AND family[Tw] AND relationship\*[Tw]) OR "work family relationship"[Tw] OR "work-family relationship"[Tw] OR "work-family relationships"[Tw] OR "work-family balance"[Tw] OR (work-family[Tw] AND balance\*[Tw]) OR "work-life-balance"[Tw] OR "work-life balance"[Tw] OR "life-work imbalance"[Tw] OR "compatibility of family and job"[Tw] OR "compatibility of family and profession"[Tw] OR "compatibility of family and career"[Tw] OR "Family Work Relationship"[Tw] OR ((work\*[Tw] AND (famil\*[Tw] OR home[Tw] OR leisure[Tw] OR life[Tw] OR nonwork[Tw] OR non-work[Tw] OR priva\*[Tw]) AND (balanc\*[Tw] OR compatibility[Tw] OR conflict\*[Tw] OR enhanc\*[Tw] OR enrich\*[Tw] OR facilitat\*[Tw] OR interact\*[Tw] OR interf\*[Tw] OR spillover[Tw] OR tension[Tw])) OR "Work-privacy-conflict"[Tw] OR "work privacy conflict"[Tw] OR "work-privacy conflicts"[Tw] OR "WPC"[Tw] OR "work-home conflict"[Tw] OR workaholism[Tw] OR "career mobility"[Tw] OR "Job Ladders"[Tw] OR "Job Ladder"[Tw]) Search ("working conditions"[Tw] OR "working environment"[Tw] OR "work environment"[Tw] OR hazard\*[Tw] OR "hazardous materials"[Tw] OR "occupational exposure"[Tw] OR "occupational exposures"[Tw] OR ergonomics[Tw] OR ergonomic[Tw] OR "noise level"[Tw] OR "noise levels"[Tw] OR nois\*[Tw] OR acoustic\*[Tw] OR sound\*[Tw] OR "irrelevant speech"[Tw] OR "background speech"[Tw] OR vibration\*[Tw] OR whole-body vibration\*[Tw] OR hand-arm vibration\*[Tw] OR "hand arm vibration"[Tw] OR "hand-arm vibrations"[Tw] OR vibration\*[Tw] OR "indoor climate"[Tw] OR "indoor environment"[Tw] OR "room climate"[Tw] OR "indoor air temperature"[Tw] OR indoor temperatur\*[Tw] OR "operative temperature"[Tw] OR "air velocity"[Tw] OR "indoor air velocity"[Tw] OR humidity\*[Tw] OR "dry air"[Tw] OR "moisture skin"[Tw] OR (eye[Tw] AND blink\*[Tw] AND frequency\*[Tw]) OR "office eye syndrome"[Tw] OR ((\*light\*[Tw] OR illumi\*[Tw] OR "photo\*[Tw] OR lumi\*[Tw]) AND (view[Tw] OR discomfort[Tw] OR eyestrain[Tw] OR asthenop\*[Tw] OR complain\*[Tw] OR window\*[Tw] OR controldisruption[Tw] OR disturbance\*[Tw] OR "synchronisation\*[Tw] OR clock[tw] OR Suprachiasmatic[Tw] OR sleep[Tw] OR \*work\*[Tw] OR occupation\*[Tw] OR office[Tw] OR deprivation[Tw] OR isalign\*[Tw])) OR "thermal comfort"[Tw] OR "thermal comfort room"[Tw] OR "comfortable climate" [Tw] OR "draught risk"[Tw] OR turbulence\*[Tw] OR "surface temperature"[Tw] OR (radiant[Tw] AND temperature[Tw] AND asymmetr\*[Tw]) OR "radiant temperature"[Tw] OR "temperature perception"[Tw] OR "natural ventilation"[Tw] OR "natural ventilations"[Tw] OR air-condition\* [Tw] OR aircondition\*[Tw] OR "air condition"[Tw] OR cooling\*[Tw] OR ventilation\*[Tw] OR ("HVAC"[Tw] AND heat\*[Tw]) OR "heat stress"[Tw] OR "heat strain"[Tw] OR "heat radiation"[Tw] OR "heat radiations"[Tw] OR cold\*[Tw] OR (cold\*[Tw] AND stress[Tw]) OR acclimatization\*[Tw] OR "ergonomics"[Tw] OR "human factors engineering"[Tw] OR "Human Factors Engineerings"[Tw] OR "physical stress"[Tw] OR "physical factor"[Tw] OR "physical factors"[Tw] OR "physical work"[Tw] OR ergonomic[Tw] OR "Human Factors"[Tw] OR "Human Engineering"[Tw] OR "process control"[Tw] OR "supervisory control"[Tw] OR "video display"[Tw] OR "visual display"[Tw] OR "video display units"[Tw] OR "computer terminals"[Tw] OR "computer terminal"[Tw] OR "data display"[Tw] OR "assembly line"[Tw] OR "conveyor belt"[Tw] OR "working space"[Tw] OR workspace[Tw] OR work space\*[Tw] OR "work equipment"[Tw] OR (ergonomic\*[Tw] AND device\*[Tw]) OR "working materials"[Tw] OR ((work[Tw] OR working[Tw]) AND (material\*[Tw] OR tool\*[Tw])) OR "human-machine System"[Tw] OR "human-machine systems"[Tw] OR (human[Tw] AND machine\*[Tw] AND (System[Tw] OR systems[Tw])) OR "man-machine"[Tw] OR telecooperation[Tw] OR "man-machine systems"[Tw] OR "man-machine system"[Tw] OR Man Machine System\*[Tw] OR "human-computer interaction"[Tw] OR "human-robot interaction"[Tw] OR "human-robot system"[Tw] OR "human-robot systems"[Tw] OR human robot system\*[Tw] OR "human-robot cooperation"[Tw] OR "human engineering"[Tw] OR "human factors engineering" [Tw] OR "expert systems"[Tw] OR "decision support system"[Tw] OR "decision support systems"[Tw] OR "automatic data processing"[Tw] OR "Automatic Information Processing"[Tw] OR "Computer Data Processing"[Tw] OR "Electronic Data Processing"[Tw] OR automation[Tw] OR "computer-based work"[Tw] OR "user performance"[Tw] OR screen[Tw] OR "data-entry task"[Tw] OR "data entry task"[Tw] OR computer\*[Tw] OR "Intelligent Systems"[Tw] OR "information technology"[Tw] OR "information systems"[Tw] OR "communication systems"[Tw] OR "communication system"[Tw] OR "communication technology" [Tw] OR "communications media" [Tw] OR "computer mediated communication" [Tw] OR "electronic communication" [Tw] OR (electronic[Tw] AND device\*[Tw]) OR "mobile device"[Tw] OR "mobile devices"[Tw] OR "mobile phone" [Tw] OR "digital telephone" [Tw] OR "wireless device" [Tw] OR "wireless telephone" [Tw] OR "cell phone" [Tw] OR "cell telephone" [Tw] OR "cellular phone" [Tw] OR handheld[Tw] OR "portable device" [Tw] OR pager[Tw] OR smartphone[Tw] OR blackberry[Tw] OR "iPhone"[Tw] OR chat[Tw] OR "electronic mail" [Tw] OR e-mail [Tw] OR Email[Tw] OR e-mails[Tw] OR emails[Tw] OR MMS[Tw] OR (instant[Tw] AND messag\*[Tw]) OR "short message" [Tw] OR "short messages"[Tw] OR "SMS"[Tw] OR "ict"[Tw] OR "IKT"[Tw] OR "ict use" [Tw] OR "information media" [Tw] OR (information[Tw] AND communication[Tw] AND media[Tw]) OR "information technology" [Tw] OR "IOS"[Tw] OR android[Tw] OR "social media" [Tw] OR supplemental[Tw] OR telecommuting[Tw] OR "use of technology" [Tw] OR "strategies of compatibility" [Tw] OR "software usability" [Tw] OR "software ergonomics"[Tw] OR "user interface" [Tw] OR "interface design" [Tw] OR visualization[Tw] OR visualisation[Tw] OR "visualisation system"[Tw] OR "visualization system"[Tw] OR "visualisation systems"[Tw] OR "visualization systems"[Tw] OR dialogue[Tw] OR dialog[Tw] OR "computer input device"[Tw] OR "computer output device"[Tw] OR screen[Tw] OR display[Tw] OR mouse[Tw] OR keyboard[Tw] OR "track ball"[Tw] OR tablet[Tw] OR "touch screen"[Tw] OR scanner[Tw] OR "human computer interaction" [Tw] OR usability[Tw])

#6  
working  
environment

#5  
Social  
relations

Search ("social networking"[Tw] OR "social environment"[Tw] OR "social environments"[Tw] OR "workplace team"[Tw] OR "workplace teams"[Tw] OR "demand control support"[Tw] OR "demand-control-support"[Tw] OR "social support"[Tw] OR ((leader[Tw] OR co-worker[Tw] OR coworker[Tw] OR workmate\*[Tw] OR supervisor\*[Tw] OR superior\*[Tw] OR "fellow worker"[Tw] OR principal\*[Tw] OR associate\*[Tw] OR colleague\*[Tw]) AND support[Tw]) OR "social buffering"[Tw] OR "social relations"[Tw] OR "social relation"[Tw] OR (coworker\*[Tw]AND relationship\*[Tw]) OR "social relation"[Tw] OR "social relationship"[Tw] OR "social relationships"[Tw] OR "interpersonal relation"[Tw] OR "interpersonal relations"[Tw] OR "interpersonal relationship"[Tw] OR "interpersonal relationships"[Tw] OR "competitive behavior"[Tw] OR "competitive behaviour"[Tw] OR mobbing[Tw] OR bullying[Tw] OR "workplace bullying"[Tw] OR harassment[Tw] OR hostile[Tw] OR hostility[Tw] OR teasing[Tw] OR "aggressive behavior"[Tw] OR "aggressive behaviour"[Tw] OR "workplace violence"[Tw] OR victimization[Tw] OR victimisation[Tw] OR "social isolation"[Tw] OR ((social[Tw] OR workplace[Tw] OR team[Tw]) AND (climate[Tw] OR conflict[Tw] OR conflicts[Tw] OR "social stress"[Tw])) OR ((co-worker[Tw] OR coworker[Tw] OR workmate\*[Tw] OR supervisor\*[Tw] OR superior\*[Tw] OR "fellow worker"[Tw] OR principal\*[Tw] OR associate\*[Tw] OR colleague\*[Tw]) AND (interaction\*[Tw] OR "group cohesion"[Tw] OR cooperation[Tw] OR cooperative[Tw] OR collaboration[Tw] OR collaborative[Tw] OR "team work"[Tw] OR "work teams"[Tw])) OR ("supervisor employee interaction"[Tw] OR "labor management relation"[Tw] OR "labor management relations"[Tw] OR leadership[Tw] OR supervisor[Tw] OR middle manag\*[Tw] OR middle level manag\*[Tw] OR "manager employee interaction"[Tw] OR "manager-employee-interaction"[Tw] OR ((leader[Tw] OR leaders[Tw] OR leadership[Tw] OR supervisor[Tw] OR supervisory[Tw] OR supervisors[Tw]) AND (qualities[Tw] OR quality[Tw] OR style[Tw] OR behavior[Tw] OR behaviour[Tw] OR skill[Tw] OR skills[Tw] OR characteristics [Tw] OR characteristic[Tw] OR traits[Tw] OR attributes[Tw] OR personality[Tw] OR attitude[Tw] OR abusive[Tw] OR destructive[Tw] OR aggressive[Tw] OR negative[Tw] OR tyrannic\*[Tw] OR undermining[Tw] OR psychopathic[Tw] OR toxic[Tw] OR despotic[Tw] OR "laissez faire"[Tw] OR passive[Tw] OR narcissistic[Tw] OR transformational[Tw] OR transactional[Tw] OR charismatic[Tw] OR "health-specific"[Tw] OR "health-domain"[Tw] OR "health-oriented"[Tw] OR authentic[Tw] OR "ethical"[Tw] OR shared[Tw] OR servant[Tw] OR distributed[Tw] OR collective[Tw] OR consensus[Tw] OR climate[Tw])) OR "abusive supervision"[Tw] OR "petty tyranny"[Tw] OR "petty authority"[Tw] OR "petty power"[Tw] OR "leader member exchange"[Tw] OR "leader-member-exchange"[Tw] OR "LMX"[Tw] OR "superior-subordinate relationship"[Tw] OR "superior subordinate relationship"[Tw] OR feedback[Tw] OR "knowledge of result"[Tw] OR "knowledge of results"[Tw] OR "performance monitoring"[Tw] OR "task monitoring"[Tw] OR "tasks monitoring"[Tw] OR "supervisory monitoring"[Tw] OR "supervisor monitoring"[Tw] OR "work monitoring"[Tw] OR "job monitoring"[Tw] OR "monitoring at work"[Tw] OR self-regulat\*[Tw] OR "action regulation"[Tw] OR "effort reward"[Tw] OR "effort-reward"[Tw] OR "effort reward imbalance"[Tw] OR "effort-reward imbalance"[Tw] OR (high effort[Tw] AND low reward[Tw]) OR overcommitment[Tw] OR "gratification crisis"[Tw] OR justice[Tw] OR injustice[Tw] OR fairness[Tw] OR "relational justice"[Tw] OR "organizational justice"[Tw] OR "organizational injustice"[Tw] OR "organizational justice"[Tw] OR "organisational injustice"[Tw] OR "distributive justice"[Tw] OR "distributive injustice"[Tw] OR "procedural justice"[Tw] OR "procedural injustice"[Tw] OR "interactional justice"[Tw] OR "interactional injustice"[Tw])

#4  
organi-  
zation of  
work

Search (((("work week length"[Tw] OR "work scheduling"[Tw] OR "personnel staffing and scheduling"[Tw] OR "work rest cycle"[Tw] OR "work rest cycles"[Tw] OR "work schedule tolerance"[Tw] OR "fixed-term employment"[Tw] OR leisure[Tw] OR night work[Tw] OR controldisruption[Tw] OR desynchronisation\*[Tw] OR desynchronization\*[Tw] OR disturbance[Tw] OR resynchronisation[Tw] OR resynchronization[Tw] OR \*synchronisation\*[Tw] OR circadian[Tw] OR "SCN"[Tw] OR chrono\*[Tw] OR "clockwork"[Tw] OR ((clock-synchronous[Tw] OR clock-actuated[Tw] OR clock-controlled[Tw]) AND (work[Tw] OR task\*[Tw] OR job\*[Tw])) OR shiftwork\*[Tw] OR "shift work"[Tw] OR "workday shifts"[Tw] OR "workday shift" OR "shift system"[Tw] OR "shift systems"[Tw] OR "shift rotation"[Tw] OR "night shift"[Tw] OR "irregular working hour"[Tw] OR "irregular working hours"[Tw] OR "night work"[Tw] OR "flexible working hour"[Tw] OR "flexible working hours"[Tw] OR "flexible work hour"[Tw] OR "flexible work hours"[Tw] OR "flexible working arrangement"[Tw] OR "flexible working arrangements" OR "flexibility in the scheduling of hours worked"[Tw] OR "flexibility in the amount of hours worked"[Tw] OR ("flexibility"[Tw] AND "working time"[Tw]) OR "irregular working hours"[Tw] OR "irregular work hours"[Tw] OR "irregular working hour"[Tw] OR "irregular work hour"[Tw] OR "irregular working time"[Tw] OR ((working[Tw] AND hour\*[Tw]) AND (variabilit\*[Tw] OR flexibilit\*[Tw])) OR flexitime[Tw] OR flextime[Tw] OR "on-call work"[Tw] OR "on-call service"[Tw] OR "emergency service"[Tw] OR "on-call duty"[Tw] OR "standby duty"[Tw] OR "active standby"[Tw] OR "standby service"[Tw] OR "work-privacy-conflict"[Tw] OR "work privacy conflict"[Tw] OR "job family relationship"[Tw] OR "work family relationships"[Tw] OR "job-family relationship"[Tw] OR "job-family relationships"[Tw] OR "work family relationship"[Tw] OR "work family relationships"[Tw] OR "work-family relationship"[Tw] OR "work-family relationships"[Tw] OR "Family Work Relationship"[Tw] OR "work-family- balance"[Tw] OR "work family balance"[Tw] OR "work-family balance"[Tw] OR "work-life-balance"[Tw] OR work-life balance[Tw] OR (compatibility[Tw] AND family[Tw] AND job[Tw]) OR (work\*[Tw] AND (famil\*[Tw] OR home[Tw] OR leisure[Tw] OR life[Tw] OR nonwork[Tw] OR non-work[Tw] OR priva\*[Tw] OR balanc\*[Tw] OR compatibility[Tw] OR conflict\*[Tw] OR enhanc\*[Tw] OR enrich\*[Tw] OR facilitat\*[Tw] OR interact\*[Tw] OR interf\*[Tw] OR spillover[Tw] OR tension[Tw])) OR "long working hours"[Tw] OR "Twenty-four/seven"[Tw] OR "extended shift"[Tw] OR "extended shifts"[Tw] OR "12-hour shift"[Tw] OR "12-hour shifts"[Tw] OR "10-hour shifts"[Tw] OR "7-day service"[Tw] OR "irregular working hour\*[Tw] OR "work hour\*[Tw] OR "hours worked"[Tw] OR "job hours"[Tw] OR "job hour"[Tw] OR "work time"[Tw] OR workhours[Tw] OR "working hours"[Tw] OR "long hours"[Tw] OR overwork[Tw] OR "extended work"[Tw] OR "working overtime"[Tw] OR "overtime work"[Tw] OR overtime[Tw] OR "compressed weeks"[Tw])) OR ("break time"[Tw] OR intermission\*[Tw] OR "intermittent breaks"[Tw] OR "intermittent rest"[Tw] OR lull[Tw] OR lulls[Tw] OR "non-working

time[Tw] OR "work to rest"[Tw] OR "off time"[Tw] OR off-time[Tw] OR pausing[Tw] OR recess[Tw] OR "recovery period"[Tw] OR "recovery periods"[Tw] OR "recovery time"[Tw] OR "recovery times"[Tw] OR "rest break"[Tw] OR "rest breaks"[Tw] OR "rest pause"[Tw] OR "rest pauses"[Tw] OR "sufficient breaks"[Tw] OR "sufficient break"[Tw] OR "sufficient rest"[Tw] OR "sufficient rests"[Tw] OR "time out"[Tw] OR ((work[Tw] AND (break\*[Tw] OR pause\*[Tw] OR rest\*[Tw])) OR "recovery opportunity"[Tw] OR "recovery opportunities"[Tw] OR pause[Tw] OR pauses[Tw] OR repose\*[Tw] OR respite\*[Tw] OR "break schedule"[Tw] OR "rest cycle"[Tw] OR "rest schedule"[Tw] OR "amount of rest"[Tw] OR "number of breaks"[Tw] OR "numbers of breaks"[Tw] OR (break\*[Tw] AND frequenc\*[Tw]) OR "rest frequency"[Tw] OR "rest frequencies"[Tw] OR "break period"[Tw] OR "break periods"[Tw] OR (brief pause\*[Tw]) OR brief rest[Tw] OR "long break"[Tw] OR "long breaks"[Tw] OR "long pause"[Tw] OR "long rest"[Tw] OR "micro break"[Tw] OR "micro breaks"[Tw] OR microbreak\*[Tw] OR "mini break"[Tw] OR "mini breaks"[Tw] OR (pause\*[Tw] AND (length\*[Tw] OR duration\*)) OR (rest\*[Tw] AND (allowance\*[Tw] OR duration\*[Tw] OR length\*[Tw] OR period\*[Tw])) OR "short break"[Tw] OR "short breaks"[Tw] OR "break organization"[Tw] OR "break organisation"[Tw] OR "break organizations"[Tw] OR "break organisations"[Tw] OR "break structure"[Tw] OR "breaks structures"[Tw] OR (pause\*[Tw] AND pattern\*[Tw]) OR "rest design"[Tw] OR (rest\*[Tw] AND (interval\*[Tw] OR pattern\*[Tw])) OR "planned rest"[Tw] OR "planned rests"[Tw] OR ((regular[Tw] OR schedule\*[Tw] OR active[Tw] OR exercise[Tw]) AND (break\*[Tw] OR rest\*[Tw] OR pause[Tw])) OR "active recovery"[Tw] OR "brief exercise"[Tw] OR "brief exercises"[Tw] OR "stretching exercise"[Tw] OR "stretching exercises"[Tw] OR "passive recovery"[Tw] OR ((afternoon[Tw] OR power[Tw] OR cat[Tw]) AND (nap[Tw] OR naps[Tw] OR napping[Tw]) OR "relaxation time"[Tw] OR "sit-down"[Tw] OR breather\*[Tw] OR nap[Tw] OR napping[Tw] OR naps[Tw] OR siesta\*[Tw] OR slumber\*[Tw] OR snooze\*[Tw] OR ((coffee[Tw] OR tea[Tw] OR smoking[Tw] OR lunch[Tw]) AND break\*[Tw]) OR "lunch hour"[Tw] OR "lunchtime"[Tw] OR "lunch time"[Tw] OR "lunch-time"[Tw] OR "meal breaks"[Tw] OR "midday break"[Tw] OR "morning break"[Tw] OR "meal time"[Tw] OR mealtime\*[Tw] OR "break room"[Tw] OR "recovery room"[Tw] OR "break rooms"[Tw] OR "recovery rooms"[Tw] OR "missed break"[Tw] OR "missed breaks"[Tw] OR "recovery time"[Tw])) OR ("task performance[Tw] AND analysis"[Tw] OR workload[Tw] OR workflow[Tw] OR "qualitative workload"[Tw] OR "quantitative workload"[Tw] OR "time pressure"[Tw] OR "mental demands"[Tw] OR "mental demand"[Tw] OR job demand\*[Tw] OR "job control"[Tw] OR interruption[Tw] OR interrupt\*[Tw] OR intrusion\*[Tw] OR distraction\*[Tw] OR disturbance[Tw] OR "being under pressure"[Tw] OR "under pressure"[Tw] OR fluctuating workload\*[Tw] OR "forced pacing"[Tw] OR "hectic work"[Tw] OR "speed of work"[Tw] OR temporal demand\*[Tw] OR time demand\*[Tw] OR "time pressure"[Tw] OR "time strain"[Tw] OR "too much work"[Tw] OR quantitative demand\*[Tw] OR quality demand\*[Tw] OR "work quantity"[Tw] OR "work complexity"[Tw] OR work demand\*[Tw] OR "work intensity"[Tw] OR "work intensification"[Tw] OR "work overload"[Tw] OR "work pace"[Tw] OR "work pressure"[Tw] OR "work speed"[Tw] OR "mental workload"[Tw] OR "work load"[Tw] OR workload[Tw] OR "labor intensity"[Tw] OR "labour intensity"[Tw] OR "job strain"[Tw] OR "work cycle"[Tw] OR "work-cycle"[Tw] OR "paced work"[Tw] OR "line work"[Tw] OR "line-work"[Tw] OR "clocked work"[Tw] OR "clocked-work"[Tw] OR "work intermissions"[Tw] OR "electronic communication"[Tw] OR communication[Tw] OR collaboration[Tw] OR colaberation[Tw] OR "organisational climate"[Tw] OR "organizational climate"[Tw] OR "psychosocial work environment"[Tw] OR Eteams[Tw] OR E-Teams[Tw] OR "virtual work teams"[Tw] OR "virtual work team"[Tw] OR virtual team\*[Tw] OR VTEAMS[Tw] OR v-team\*[Tw] OR "remote leadership"[Tw])

#3

emotional demands (work content and task)

Search (#2) OR ("compassion fatigue"[Tw] OR ((emotion\*[Tw] AND (labor[Tw] OR labour[Tw] OR demand\*[Tw] OR dissonance\*[Tw] OR exhaustion[Tw] OR work[Tw] OR regulation[Tw])) OR "mental fatigue"[Tw] OR satiation[Tw] OR "emotional labor"[Tw] OR "emotional labour"[Tw] OR (emotion\*[Tw] AND work\*[Tw]) OR "emotion management"[Tw] OR "emotions management"[Tw] OR "emotional demand"[Tw] OR "emotional demands"[Tw] OR "emotional dissonance"[Tw] OR "emotion-rule dissonance"[Tw] OR "emotion rule dissonance"[Tw] OR "emotive dissonance"[Tw] OR "Surface Acting"[Tw] OR "Deep Acting"[Tw] OR "emotion suppression"[Tw])

#2

work content and task

((job[Tw] AND content[Tw]) OR (job[Tw] AND characteristic\*[Tw]) OR "self-managing work team"[Tw] OR "self-managing work teams"[Tw] OR "self managing work team"[Tw] OR "self managing work teams"[Tw] OR "job enrichment"[Tw] OR (task[Tw] AND complexit\*[Tw]) OR "work simplification"[Tw] OR ((repetitiv\*[Tw] OR repetitious[Tw]) AND (work\*[Tw] OR task\*[Tw] OR job\*[Tw])) OR (job[Tw] AND rotation\*[Tw]) OR (monoton\*[Tw] AND (work\*[Tw] OR task\*[Tw] OR job\*[Tw])) OR "action regulation"[Tw] OR (task\*[Tw] AND identit\*[Tw]) OR (task\*[Tw] AND signific\*[Tw]) OR (task[Tw] AND order\*[Tw]) OR (job\*[Tw] AND complexit\*[Tw]) OR (work[Tw] AND complexit\*[Tw]) OR Tayloris\*[Tw] OR Toyotis\*[Tw] OR (selfmanag\*[Tw] AND team\*[Tw]) OR "job enlargement"[Tw] OR "job rotation"[Tw] OR "job rotations"[Tw] OR "self-directed work group"[Tw] OR "self-directed work groups"[Tw] OR "self-managing work group"[Tw] OR "self-managing work groups"[Tw] OR (autonom\*[Tw] AND group\*[Tw]) OR "self-managing work group"[Tw] OR "autonomous groups"[Tw] OR "autonomous work group"[Tw] OR "autonomous work groups"[Tw] OR "self-directed work team"[Tw] OR "self-directed work team"[Tw] OR "self directed work team"[Tw] OR (work[Tw] AND team\*[Tw]) OR "cross-functional team"[Tw] OR "cross-functional teams"[Tw] OR "cross functional team"[Tw] OR "crossfunctional team"[Tw])) OR ("job control"[Tw] OR "job demand"[Tw] OR "job demands"[Tw] OR "freedom of action"[Tw] OR ((freehand[Tw] OR freedom[Tw]) AND (work\*[Tw] OR job\*[Tw] OR task\*[Tw])) OR "freedom to operate"[Tw] OR "decision latitude"[Tw] OR "decision authority"[Tw] OR autonomy[Tw] OR "job crafting"[Tw] OR "influence at work"[Tw] OR "influence on task"[Tw] OR "task order"[Tw] OR "skill discretion"[Tw] OR "job discretion"[Tw] OR boredom[Tw] OR "active job"[Tw] OR "active jobs"[Tw])) OR (monotony[Tw] OR "task variety"[Tw] OR (task[Tw] AND

#1  
(Mesh-  
Terms)

variabilit\*[Tw]) OR repetitiveness[Tw] OR repetitive task\*[Tw] OR repetitive work[Tw] OR repetitive job\*[Tw] OR "monotonous work"[Tw] OR monotonous task\*[Tw] OR monotonous job\*[Tw]))  
OR ((information\*[Tw] AND volume[Tw]) OR information-volume[Tw] OR (information\*[Tw] AND (quantit\*[Tw] OR qualit\*[Tw] OR system\*[Tw])) OR "missing data"[Tw] OR "lack of information"[Tw] OR "missing information"[Tw] OR "missing informations"[Tw] OR (information\*[Tw] AND (inadequate[Tw] OR overload[Tw])) OR "information overload"[Tw] OR "stimulus satiation"[Tw] OR overstimulation[Tw] OR "sensory overload"[Tw] OR "information systems"[Tw] OR "data display"[Tw]))  
OR (responsibility[Tw] OR responsibilities[Tw] OR "sense of responsibility"[Tw] OR remit[Tw] OR "area of responsibility"[Tw] OR "field of activity"[Tw] OR "field of work"[Tw] OR assignment[Tw] OR "job description"[Tw] OR (range\*[Tw] AND task\*[Tw]) OR "diffusion of responsibility"[Tw] OR "role conflict"[Tw] OR "role conflicts"[Tw] OR (professional\*[Tw] AND identit\*[Tw]) OR "job role"[Tw] OR "occupational role"[Tw] OR "occupational roles"[Tw] OR "professional role"[Tw] OR "professional roles"[Tw] OR "work role"[Tw] OR "work roles"[Tw] OR "command structure"[Tw] OR "command structures"[Tw] OR hierarchy[Text Word OR "level hierarchy"[Tw] OR "no clear hierarchy"[Tw] OR "flat hierarchy"[Tw] OR "flat hierarchical structure"[Tw] OR "flat organisation"[Tw] OR "flat organisations"[Tw] OR "flat organization"[Tw] OR "flat organizations"[Tw] OR "horizontal organisation"[Tw] OR "horizontal organisations"[Tw] OR "horizontal organization"[Tw] OR "horizontal organizations"[Tw] OR (level\*[Tw] AND hierarch\*[Tw]) OR "no clear hierarchy"[Tw] OR "flat hierarchy"[Tw] OR "flat hierarchical structure"[Tw] OR "flat hierarchical structures"[Tw] OR accountability[Tw]))  
OR (qualification\*[Tw] OR "job knowledge"[Tw] OR "work education"[Tw] OR (education\*[Tw] AND qualit\*[Tw]) OR "professional competence"[Tw] OR "professional competences"[Tw] OR "technical expertise"[Tw] OR "professional expertise"[Tw] OR "lack of expertise"[Tw] OR "job training"[Tw] OR "on-the-job training"[Tw] OR "manpower training"[Tw] OR ((vocational[Tw] OR job[Tw] OR occupational[Tw]) AND (training\*[Tw] OR education\*[Tw])) OR "aspiration level"[Tw] OR "aspiration levels" OR "knowledge level"[Tw] OR "knowledge levels"[Tw])  
Search ("Systems Analysis"[Mesh] OR "Job Description"[Mesh] OR "Professional Autonomy"[Mesh] OR "Boredom"[Mesh] OR "Professional Role"[Mesh] OR "Professional Competence"[Mesh] OR "Mental Fatigue"[Mesh] OR "Compassion Fatigue"[Mesh] OR "Shift Work Schedule"[Mesh] OR "Work Schedule Tolerance"[Mesh] OR "Workflow"[Mesh] OR "Workforce"[Mesh] OR "Workload"[Mesh] OR "Social Networking"[Mesh] OR "Bullying"[Mesh] OR "Cyberbullying"[Mesh] OR "Leadership"[Mesh] OR "Professional Role"[Mesh] OR "Workplace"[Mesh] OR "Hazardous Substances"[Mesh] OR "Noise, Occupational"[Mesh] OR "Light"[Mesh] OR "Light/psychology"[Mesh] OR "Lighting"[Mesh] OR "Vibration"[Mesh] OR "Hand-Arm Vibration Syndrome"[Mesh] OR "Sound"[Mesh] OR "Ergonomics"[Mesh] OR "Electronic Data Processing"[Mesh] OR "Man-Machine Systems"[Mesh] OR "Data Display" [Mesh] OR "Computer Terminals"[Mesh] OR "Work-Life Balance"[Mesh] OR "Employment"[Mesh] OR "Work Schedule Tolerance"[Mesh]OR "Change Management"[Mesh] OR "Career Mobility"[Mesh])

**Table 14** Search strategy for Business Source Premiere

Search	Query
S35	S34 Eingrenzung Published Date: 20000101-20191231
S34	S28 AND S33
S33	S29 OR S32
S32	S29 AND S30
S31	S29 OR S30
S30	S12 OR S15 OR S18 OR S23 OR S27
S29	( TX Burnout OR TX Job Stress OR TX (job AND stress) OR TX Work Stress OR TX (work AND stress) OR TX (stress AND psychological) OR TX psychological stress OR TX mental stress OR TX mental strain OR TX psychological strain OR TX work related stress OR TX work-related stress OR TX occupational stressor* OR TX ((mentale OR psychische) AND Beanspruchung) OR TX "psychische Belastung" OR TX (psychisch* AND Stress) OR TX "beruflicher Stress" OR TX (Beruf AND Stress) OR TX (berufsbedingt AND Stress) OR TX stress OR TX strain OR TX Belastung OR TX Beanspruchung OR TX ((mental OR psychisch) AND (beanspruchend OR belastend)) OR TX berufsbedingt* Stressor OR TX psychisch* Stressor ) OR ( DE "JOB stress" OR DE "BURNOUT (Psychology)" OR DE "WORK -- Psychological aspects")
S28	( TX ((small OR small-medium OR small-scale OR medium OR medium-sized OR medium sized OR mediumsized OR midsized OR mid-sized OR midsi* OR micro OR family OR families) AND (enterprise OR enterprises OR enterpri* OR busines* OR business OR businesses OR company OR companies OR workplace OR workplaces)) OR TX "small & medium-sized business" OR TX "small & medium-sized businesses" OR TX "family business" OR TX "family businesses" OR TX "family company" OR TX "family companies" OR TX " family-owned business" OR TX " family-owned businesses" OR TX "family owned business" OR TX "family owned businesses" OR TX "family firm" OR TX "family firms" OR TX Microenterprise* OR TX "family busines*" OR TX "family company" OR TX "family companies" OR TX "SME" OR TX "SMEs" OR TX "Kleine mittlere Unternehmen" OR TX ((klein* OR mittelständig OR mittel OR mittlere*) AND (Unternehmen OR Betrieb* OR Firmen OR Firma OR Gewerbe)) OR TX "KMU" OR TX "Kleine Unternehmen" OR TX "Mittlere Unternehmen" OR TX "kleine AND mittlere Betriebe" OR TX "Klein- AND Mittelbetriebe" OR TX "KMB" OR TX "Klein- Mittelunternehmen" OR TX "klein* mittelgroß*" OR TX "Kleinstunternehmen" OR TX Familienunternehmen OR TX Familienbetrieb OR TX (Familien AND (Unternehmen OR Betrieb*)) OR TX Kleinstunternehmen) OR ( DE "Small Businesses" OR DE "Family Business" )
S27	S24 OR S25 OR S26
S26	TX "Job Family Relationship" OR TX "Work Family Relationship" OR TX "Work-family balance" OR TX "work-life-balance" OR TX "compatibility of family and job" OR TX "compatibility of family and profession" OR TX "compatibility of family and career" OR TX "work-life balance" OR TX "Family Work Relationship" OR TX ((work*) AND (famil* OR home OR leisure OR life OR nonwork OR non-work OR priva*) AND (balanc* OR compatibility OR confict* OR enhanc* OR enrich* OR facilitat* OR interact* OR inter* OR s pillover OR tension)) OR TX Work-privacy-conflict OR TX "work privacy conflict" OR TX work-privacy conflict* OR TX "WPC" OR TX work-home conflict OR TX workaholism OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie" OR TX "Work-Life-Balance" OR TX "Work-Life Balance" OR TX (Vereinbarkeit AND (Familie OR Beruf OR Arbeit))
S25	TX "flexible work arrangements" OR TX flexible employ* OR TX "flexible employment contract*" OR TX "flexible work contract*" OR TX contingent employ* OR TX contingent work* OR TX atypical work* OR TX atypical employ* OR TX "non-standard work*" OR TX nonstandard employ* OR TX "non-standard employ*" OR TX nonstandard employ* OR TX "non-regular employ*" OR TX "non-permanent employ*" OR TX nonpermanent employ* OR TX nontraditional employ* OR TX nontraditional occupation* OR TX "precarious work*" OR TX "precarious employ*" OR TX unstable work* OR TX unstable employ* OR TX "employment type*" OR TX employment contract* OR TX work contract* OR TX "temporary employment agency*" OR TX temporary employ* OR TX temporary work* OR TX "agency work*" OR TX multiple employ* OR TX "multiple job hold*" OR TX (moonlighting AND work) OR TX marginal employ* OR TX short-term contract* OR TX short-term work* OR TX "fixed-term contract*" OR TX "fixed-term employ*" OR TX "temporary work contract*" OR TX "part-time staff" OR TX "part-time employ*" OR TX "part-time work*" OR TX self-employment OR TX "independent contractors" OR TX freelancer* OR TX sole traders OR TX casual work* OR TX casual employ* OR casual job* OR TX casual contract* OR TX contract work* OR TX seasonal work* OR TX seasonal employ* OR TX seasonal occupation* OR TX multiple job* OR TX Arbeitnehmerüberlassung OR TX "atypische Beschäftigung*" OR TX "atypische Beschäftigung*" OR TX "atypische Arbeit*" OR TX Normalarbeitsverhältnis OR TX "prekäre Beschäftigung*" OR TX "prekaere Beschäftigung*" OR TX "flexible Arbeit*" OR

	TX "flexible Beschäftigung*" OR TX "flexible Beschaeftigung*" OR TX Mehrfachbeschäftigung OR TX Mehrfachbeschaeftigung OR TX "geringfügige Beschäftigung" OR TX "geringfuegige Beschaeftigung" OR TX Minijob OR TX "geringfügig Beschäftigte" OR TX "geringfuegig Beschaeftigte" OR TX "Leiharbeit*" OR TX "Zeitarbeit*" OR TX Tagelöhner OR TX Tageloehner OR TX "befristet beschäftigt" OR TX "befristet beschaeftigt" OR TX Teilzeitarbeit OR TX Teilzeitbeschäftigung OR TX Teilzeitbeschaeftigung OR TX ((selbstständig* OR selbststaendig AND (Arbeit* OR Beschäftigung* OR Beschaeftigung*)) OR TX freiberufler*
S24	"occupational mobility" OR "Job Mobility" OR "Mobility Occupational" OR "spatial mobility" OR TX commuting OR TX commute OR TX (work AND travel*) OR TX "business travel" OR TX "sales force" OR TX "field service" OR TX overnighter OR TX "mobile worker*" OR TX "adaptability personality" OR TX "Life-Work Imbalance" OR TX "work-life balance" OR TX "work-life-balance" OR TX "on-call work" OR TX "job insecurity" OR TX "job security" OR TX "employment uncertainty" OR TX "job uncertainty" OR TX "flexible work arrangement*" OR TX "atypical employment" OR TX "flexible employment" OR TX "alternative employment" OR TX "flexible employment" OR TX contract OR TX "temporary work" OR TX "temporary employment" OR TX flexicurity OR TX "flexible workers" OR TX "nonstandard work" OR TX "substandard job*" OR TX "nonstandard employment" OR TX "workplace restructuring" OR TX "part-time job*" OR TX "labor market segmentation" OR TX "temporary work" OR TX workaholism OR TX "workfamily-border" OR TX "work-home border" OR TX "border theory" OR TX "boundary flexibility" OR TX "boundary management" OR TX "boundary spanning" OR TX "boundary strategies" OR TX "boundary strength" OR "workfamily-border" OR "work-home border" OR TX dislimitation OR TX permeability OR TX segmentation OR TX "remote work" OR TX "telework" OR TX "working at home" OR TX "berufliche Mobilität" OR TX Berufsmobilität OR TX Mobilität OR TX "räumliche Mobilität" OR TX "mobile Arbeit" OR TX Pendeln OR TX Berufspendler OR TX "berufliches Pendeln" OR TX Wochenpendler OR TX Tagespendler OR TX Pendelmobilität OR TX Außendienst OR TX erweiterte Erreichbarkeit OR TX Entgrenzung OR TX Durchlässigkeit OR TX Segmentierung OR TX "Grenz* Theorie" OR TX "Grenze zwischen Arbeit und Privatleben" OR TX Vereinbarkeitsstrategie OR TX Detachment OR Entgrenzung OR "Grenze zwischen Arbeit und Privatleben" OR "entgrenzte Arbeit" OR TX Zeitarbeit OR TX "Flexible Beschäftigungsverhältnisse" OR TX "Flexible Beschaeftigungsverhaeltnisse" OR TX Prekarisierung OR TX "atypische Verträge" OR TX "atypische Vertraege" OR TX "atypische Arbeitsform*" OR TX Telearbeit OR TX Prekarität OR TX Prekaritaet OR TX "prekäre Arbeit*" OR TX "prekaere Arbeit*" OR TX Leiharbeit OR TX Zeitarbeit OR TX "neue Arbeitsformen" OR TX "Flexibilisierung"
S23	S19 OR S20 OR S21 OR S22
S22	TX "human-machine System*" OR TX "human machine* System*" OR TX "man-machine" OR TX telecooperation OR TX "man-machine systems" OR TX "man machine system*" OR TX "human-computer interaction" OR TX "human-robot interaction" OR TX "human-robot system" OR TX "human-robot cooperation" OR TX "human engineering" OR TX "human factors engineering" OR TX "expert systems" OR TX "decision support system*" OR TX "automatic data processing" OR TX automation OR TX "computer-based work" OR TX "user performance" OR TX screen OR TX "data-entry task" OR TX "data entry task" OR TX computer* OR TX "Intelligent Systems" OR TX "information technology" OR TX "information systems" OR TX "communication systems" OR TX "communication technology" OR TX "communications media" OR TX "computer mediated communication" OR "electronic communication" OR "electronic device*" OR "mobile device*" OR "mobile phone" OR "digital telephone" OR Digitaltelefon OR "wireless device" OR "wireless telephone" OR TX "cell phone" OR TX "cell telephone" OR TX "cellular phone" OR TX handheld OR "portable device" OR TX pager OR TX smartphone OR TX blackberry OR TX "iPhone" OR TX chat OR TX "electronic mail*" OR TX "e-mail*" OR TX MMS OR TX "instant messag*" OR TX "short messag*" OR TX "SMS" OR TX "ict" OR TX "IKT" OR TX "ict use" OR TX "Information media" OR TX "Information and communication media" OR TX "information technology" OR TX "IOS" OR TX android OR TX "social media" OR TX supplemental OR TX telecommuting OR TX "use of technology" OR TX "strategies of compatibility" OR TX "software usability" OR TX software ergonomics OR TX "user interface*" OR TX "interface design" OR TX visualization OR TX visualisation OR TX visualisation system OR TX visualization system OR TX dialogue OR TX dialog OR TX "computer input device*" OR TX "computer output device*" OR TX screen OR TX display OR TX mouse OR TX keyboard OR TX track ball OR TX tablet OR TX touch screen OR TX scanner OR TX "human computer interaction" OR TX usability OR TX Mensch-Computer-Interaktion OR TX "Mensch Computer Interaktion" OR TX Arbeitsmittel OR TX "Mensch-Maschine-Systeme" OR TX "Mensch Maschine Systeme*" OR TX "Mensch-Roboter-Interaktion" OR TX "Mensch Roboter Interaktion" OR TX "Mensch-Roboter-Systeme" OR TX "Mensch Roboter Systeme" OR TX "Mensch-Roboter-Kooperation" OR TX "Mensch Roboter Kooperation" OR TX Ergonomie OR TX Expertensystem OR TX Software-Ergonomie OR TX Kommunikationssysteme OR TX Kommunikationstechnologien OR TX "Informations- und Kommunikationstechnologien" OR TX Mobiltelefon OR TX Handy OR TX Digitaltelefon OR TX ((Gerät* OR Geraet*) AND (tragbare* OR schnurlos* OR kabellos OR mobil* OR elektronisch*)) OR TX Handgerät OR TX Handgeraet OR TX Mobilfunkempfänger OR TX Mobilfunkempaenger OR TX Kommunikationsmedien OR TX "computergestützte Kommunikation" OR TX "computergestuetzte Kommunikation" OR TX "elektronische Kommunikation" OR TX Telekommunikation OR TX Informationstechnologie OR TX Informationssysteme OR TX "Informations- und Kommunikationsmedien" OR TX Informationsmedien OR TX "IKT Nutzung" OR TX erreichbar OR TX Erreichbarkeit OR TX Kurznachrichten OR TX Bildnachrichten OR TX "elektronische Post" OR TX Kurznachrichtendienst OR TX "soziale Medien" OR TX "Technologie Nutzung" OR TX „Software Gebrauchstauglichkeit“ OR TX Software-Ergonomie OR TX Software OR TX Benutzerschnittstelle OR TX Dialoggestaltung OR TX Informationsdarstellung OR TX Benutzerführung OR TX Benutzerfuehrung OR TX Dialogführung OR TX Dialogfuehrung OR TX "Computer Eingabegerät*" OR TX "Computer Ausgabegerät*" OR TX "Computer



	Eingabegeraet** OR TX "Computer Ausgabegeraet**" OR TX Bildschirm OR TX "visuelle Informationsdarbietung" OR TX Maus OR TX Tastatur OR TX Trackball OR TX Tablet OR TX Touchscreen OR TX Scanner OR TX "Mensch-Computer-Interaktion" OR TX Informationssystem* OR TX "automatisierte Informationsverarbeitung" OR TX Automation OR TX Prozesskontrolle OR TX "überwachende Kontrolle" OR TX "ueberwachende Kontrolle" OR TX "visuelle Informationsdarbietung" OR TX Fließband OR TX "ungünstige Arbeitsräume" OR TX unguenstige Arbeitsraeume OR TX räumliche Enge OR TX raemliche Enge OR TX (Gestaltung AND Signale* OR Hinweise*)
S21	OR TX "process control" OR TX "supervisory control" OR TX "video display" OR TX "visual display" OR TX "video display units" OR TX "computer terminals" OR TX "data display" OR TX "assembly line" OR TX "conveyor belt" OR TX "working space" OR TX workspace OR TX "work space**" OR TX "work equipment" OR TX "ergonomic* device**" OR TX "working materials" OR TX "work material**" OR TX "work tool**" OR TX "working tool**" OR TX Mensch-Computer-Interaktion OR TX "computerunterstützte Entscheidungshilfen" OR TX "automatisierte Informationsverarbeitung" OR TX Automation OR TX Prozesskontrolle OR TX "überwachende Kontrolle" OR TX "ueberwachende Kontrolle" OR TX "visuelle Informationsdarbietung" OR TX Fließband OR TX "ungünstige Arbeitsräume" OR TX unguenstige Arbeitsraeume OR TX räumliche Enge OR TX raemliche Enge OR TX (Gestaltung AND Signale* OR Hinweise*)
S20	TX Ergonomics OR TX "human factors engineering" OR TX "physical stress" OR TX "physical factor" OR TX "physical factors" OR TX "physical work" OR TX Ergonomie OR TX ergonomische Gestaltung OR TX Arbeitsplatzgestaltung OR TX "körperliche Arbeit" OR TX "körperliches Arbeiten" OR TX "physische Arbeit" OR TX physische Faktoren
S19	TX "working conditions" OR TX "work* environment" OR TX Arbeitsbedingungen OR TX Arbeitsumgebung OR TX hazard* OR TX "hazardous materials" OR TX "occupational exposure" OR TX ergonomics OR TX "noise level**" OR TX nois* OR TX acoustic* OR TX sound* OR TX "irrelevant speech" OR TX "background speech" OR TX Lärm OR TX Laerm OR TX Schall OR TX Hintergrundgeräusch OR TX Hintergrundgeraeusch OR TX Hintergrundbeschallung OR TX Hintergrundstimmen OR TX Lärmpegel OR TX Laermpegel OR TX Geräuschpege I OR TX Geraeuschpegel OR TX Nebengeräusch OR TX Nebengeraeusch OR TX vibration* OR TX whole-body vibration* OR TX hand-arm vibration* OR TX "hand arm vibration**" OR TX Vibration* OR TX Ganzkörpervibration* OR TX Ganzkoerpervibration* OR TX Ganz-Körper-Vibration* OR TX Ganzkörper-Vibrationen OR TX Ganzkoerper-Vibrationen OR TX „indoor climate**“ OR TX „indoor environment**“ OR TX "room climate**" OR TX "indoor air temperatur**" OR TX "indoor temperatur**" OR TX "operative temperatur**" OR TX "air velocity**" OR TX "indoor air velocity**" OR humidity* OR „dry air“ OR „moisture skin**“ OR „eye blink* frequency**“ OR „office eye syndrom**“) OR („thermal comfort**“ OR „thermal comfort* room**“ OR „comfortable climate**“ OR „draught risk“ OR turbulence* OR surface temperature* OR „radiant temperature asymmetry“ OR „radiant temperature“ OR „Temperature Perception**“) OR („natural ventilation**“ OR „air-condition**“ OR „aircondition**“ OR „air condition**“ OR cooling* OR ventilation* OR HVAC heat* OR „heat stress“ OR „heat strain**“ OR „heat radiation**“ OR cold* OR „cold* stress“ OR acclimatization* OR TX Effektivtemperatur OR TX Normal-Effektivtemperatur OR TX Basis-Effektivtemperatur OR TX Raumtemperatur OR TX Raumlufttemperatur OR Oberflächentemperatur* OR TX Oberflaechentemperatur* OR TX Oberflaechentemperatur OR TX Zugluft* OR TX "störender Luftzug**" OR TX "stoerender Luftzug**" OR TX Raumluftgeschwindigkeit* OR TX Klimatechnik* OR TX Turbulenz* OR Strahlungsasymmetrie* OR Klimatechnik* OR Luftfeuchtigkeit* OR "trockene Luft" OR Raumklima* OR „thermischer Raumkomfort“ OR TX "raumklimatisch* Bedingung**" OR TX Raumklimasituation OR TX Raumklimasituationen OR TX Zugluftisiko* OR TX Behaglichkeit* OR TX Hitzestress OR TX Wärmestrahlung OR TX Waermestrahlung OR TX Kälte OR TX Kaelte OR TX Akklimatisation OR TX Akklimatisierung OR TX Hitze OR TX ((light* OR illumi* OR *photo* OR lumi*) AND (view OR discomfort OR eyestrain OR asthenop* OR complain* OR window* OR controldisruption OR desynchronisation* OR disturbance OR *synchronisation* OR circadian OR SCN OR chrono* OR clock OR Suprachiasmatic OR sleep OR *work* OR occupation* OR office OR deprivation OR entrain* OR misalign*)) OR TX Beleuchtung OR TX Lichtwirkung OR TX Licht OR TX Zeitgeber OR TX Disruption
S18	S16 OR S17
S17	TX "supervisor employee interaction" OR TX "labor management relation**" OR TX "labour management relation" OR TX "leadership" OR TX supervisor OR TX middle manag* OR TX middle level manag* OR TX "manager employee interaction" OR TX "manager-employee-interaction" OR TX ((leader OR leadership OR supervisor OR supervisory) AND (qualities OR quality OR style OR behavior OR behaviour OR skill OR skills OR characteristics OR characteristic OR traits OR attributes OR personality OR attitude OR abu-sive OR destructive OR aggressive OR negative OR tyrannic* OR undermining OR psychopathic OR toxic OR despotic OR "laissez faire" OR passive OR narcissistic OR transformational OR transactional OR charismatic OR "health-specific" OR "health-domain" OR "health-oriented" OR authentic OR "ethical" OR shared OR servant OR distributed OR collective OR consensus OR climate)) OR TX "abusive supervision" OR TX "petty tyranny" OR TX "petty authority" OR TX "petty power" OR TX "leader member exchange" OR TX "LMX" OR TX "superior-subordinate relationship" OR TX "superior subordinate relationship" OR TX Rückmeldung OR TX Rueckmeldung OR TX "Kenntnis der Ergebnisse" OR TX Monitoring OR TX Selbstregulation OR TX Überwachen OR TX Ueberwachen OR TX Vorgesetzten-Untergebenen-Interaktion OR TX Führungsstil OR TX Fuehrungsstil OR TX Führung OR TX Fuehrung OR TX "Remote Leadership" OR TX "Vorgesetzte**" OR TX Teamleiter OR TX Teamleitung OR TX "gesunde Führung" OR TX "gesunde Fuehrung" OR TX "gesund Führen" OR TX "ungesunde Fuehrung" OR TX "gesund Fuehren" OR TX "ungesunde Fuehrung" OR TX ((auritär* OR autoritaer* OR direktiv* OR kooperativ* OR partizipativ* OR coachend* OR situativ* OR narzistisch* OR gesundheitsorientier* OR authentisch* OR geteilt* OR tyrannisch* OR aggressiv* OR charismatisch* OR willkürlich* OR willkuerlich* OR engstirnig*) AND (Führung OR Fuehrung OR Führungsstil OR Fuehrungsstil

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OR Vorgesetzte\*)) OR TX feedback OR TX "knowledge of result\*" OR TX "performance monitoring" OR TX "task\* monitoring" OR TX "supervisory monitoring" OR TX "supervisor monitoring" OR TX "work monitoring" OR TX "job monitoring" OR TX "monitoring at work" OR TX self-regulat\* OR TX "action regulation" OR TX "effort reward" OR TX "effort-reward" OR TX "effort reward imbalance" OR TX "effort-reward imbalance" OR TX overcommitment OR TX "gratification crisis" OR TX justice OR TX injustice OR TX fairness OR TX "relational justice" OR TX "organizational justice" OR TX "organizational injustice" OR TX "organizational justice" OR TX "organisational injustice" OR TX "distributive justice" OR TX "distributive injustice" OR TX "procedural justice" OR TX "procedural injustice" OR TX "interactional justice" OR TX "interactional injustice" OR TX Rückmeldung OR TX Rueckmeldung OR TX Handlungsregulation\* OR TX Gratifikationskrise OR TX Ungerechtigkeit OR TX "organisationale Gerechtigkeit" OR TX "organisationale Ungerechtigkeit" OR TX "fehlende Anerkennung" OR TX Entlohnung OR TX Wertschätzung OR TX Wertschaetzung OR TX Feedback OR TX Anerkennung OR TX Gerechtigkeit OR TX Fairness OR TX Glaubwürdigkeit OR TX Glaubwuerdigkeit OR TX Verlässlichkeit OR TX Verlaesslichkeit

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S16 TX social networking OR TX social environment\* OR TX workplace team\* OR TX "demand control support" OR TX "social support" OR TX ((leader OR "co-worker" OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague\*) AND support) OR TX "social buffering" OR TX "social relations" OR TX coworker relationship OR TX "social relation" OR TX "social relationship" OR TX "social relationships" OR TX "interpersonal relation" OR TX "interpersonal relations" OR TX "interpersonal relationship" OR TX "interpersonal relationships" OR TX "competitive behavior" OR TX "competitive behaviour" OR TX mobbing OR TX bullying OR TX "workplace bullying" OR TX harassment OR TX hostile OR TX hostility OR TX teasing OR TX "aggressive behavior" OR TX "aggressive behaviour" OR "workplace violence" OR TX victimization OR TX victimisation OR TX "social isolation" OR TX ((social OR workplace OR team) AND (climate OR conflict OR conflicts OR "social stress\*")) OR TX "supervisor employee interaction" OR TX ((co-worker OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague) AND interaction) OR TX "group cohesion" OR TX cooperation OR TX cooperative OR TX collaboration OR TX collaborative OR TX "team work" OR TX "work teams" OR TX "soziale Beziehung\*" OR TX "Soziale Unterstützung" OR TX Mitarbeiterunterstützung OR TX ((Mitarbeiter OR Kollege OR Kollegen OR Vorgesetzter OR Vorgesetzte) AND (Unterstützung OR Unterstuetzung) OR TX "zwischenmenschliche Beziehung" OR TX "zwischenmenschliche Beziehungen" OR TX Gruppenzusammenhalt OR TX Teamzusammenhalt OR TX "soziales Klima" OR TX Teamklima OR TX "Klima im Team" OR TX Arbeitsklima OR TX Belästigung\* OR TX Belaestigung\* OR TX Feindseligkeit OR TX Feindseligkeiten OR TX "aggressives Verhalten" OR TX "Gewalt am Arbeitsplatz" OR TX Mobbing OR TX Schikane OR TX schikanieren OR TX "soziale Isolation" OR TX Ausgrenzung OR TX Ausgrenzungen OR TX Konflikt OR TX Konflikte OR TX sozialer Stress\*

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S15 S13 OR S14

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S14 OR TX "break time\*" OR TX intermission\* OR TX intermittent breaks OR TX intermittent rest OR TX lull OR TX lulls OR TX "non-working time\*" OR TX "work to rest" OR TX "off time\*" OR TX off-time OR TX pausing OR TX recess OR TX "recovery period\*" OR TX "recovery time\*" OR TX "rest break" OR TX "rest breaks" OR TX "rest pause\*" OR TX "sufficient break\*" OR TX "sufficient rest\*" OR TX "time out\*" OR TX work break\* OR TX work pause\* OR TX work rest OR TX recovery opportunity OR TX recovery opportunities OR TX pause OR TX pauses OR TX repose\* OR TX respite\* OR TX "break schedule\*" OR TX "rest cycle\*" OR TX "rest schedule\*" OR TX "amount of rest" OR TX "number\* of breaks" OR TX break\* frequenc OR TX rest frequency OR TX rest frequencies OR TX break period\* OR TX brief pause\* OR TX brief rest OR TX "long break" OR TX "long breaks" OR TX "long pause\*" OR TX "long rest\*" OR TX "micro break\*" OR TX microbreak\* OR TX "mini break\*" OR TX "pause\* length\*" OR TX "pause\* duration\*" OR TX "rest allowance\*" OR TX rest duration OR TX rest length OR TX rest period\* OR TX short break\* OR TX break organization\* OR TX break organisation\* OR TX "break\* structure\*" OR TX "pause\* pattern\*" OR TX "rest design\*" OR TX "rest interval\*" OR TX "rest pattern\*" OR TX "planned rest\*" OR TX "regular break\*" OR TX "regular rest\*" OR TX "scheduled break\*" OR TX "scheduled rest\*" OR TX "active break\*" OR TX "active pause\*" OR TX "active recover\*" OR TX "active rest" OR TX "brief exercise\*" OR TX "exercise break" OR TX "exercise\* breaks" OR TX "exercise rest" OR TX "exercise rests" OR TX stretching exercise\* OR TX afternoon nap\* OR TX passive recovery OR TX power nap\* OR TX relaxation time\* OR TX "sit-down" OR TX breather\* OR TX nap OR TX napping\* OR TX naps OR TX siesta\* OR TX slumber\* OR TX snooze\* OR TX "coffee break" OR TX "coffee breaks" OR TX "tea break\*" OR TX "smoking breaks" OR TX "lunch break" OR TX "lunch breaks" OR TX "lunch hour\*" OR TX "lunchtime\*" OR TX "lunch time\*" OR TX "lunch-time" OR TX "meal breas" OR TX "midday break" OR TX "meal time\*" OR TX "mealtime\*" OR TX "break room\*" OR TX "recovery room\*" OR TX "missed breaks" OR TX "recovery time" OR TX Schlaf\* OR TX Erholung OR TX (Ruhe\* NOT Ruhestand\*) OR TX Paus\* OR TX Rast\* OR TX "Arbeit-Ruhe-Rhythmen" OR TX Nap\* OR TX Frühstück\* OR TX Fruestueck\* OR TX Auszeit OR TX Schlummer\* OR TX Arbeitspause\* OR TX Kurzpau\* OR TX Mittagspause\* OR TX Dösen OR TX Doesen OR TX Mittagessen OR TX stretching OR TX Vesper\* OR TX Atempause\* OR TX Mittagsschlaf\* OR TX Mittagsschlafchen OR TX Mittagsschlaefchen OR TX Bewegungspau\* OR TX Arbeits-Erholungs\* OR TX Kaffeepaus\* OR TX Nickerchen OR TX Zigarettenpause\* OR TX Regenerationsphase\* OR TX Imbiss\* OR TX Verschnaufpause\* OR TX Regenerationspau\* OR TX Auszeit OR TX Büroschlaf\* OR TX Bueroschlaf\* OR TX Büroschlafchen OR TX Bueroschlaefchen OR TX Pausenregime

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S13 TX "work week length" OR TX "work scheduling" OR TX "personnel staffing and scheduling" OR TX "work rest cycle\*" OR TX "work schedule tolerance" OR TX fixed-term employment OR TX leisure OR TX night work OR TX controldisruption OR TX desynchronisation\* OR TX "desynchronization\*" OR TX resynchronisation OR TX disturbance OR TX synchronisation\* OR TX synchronization OR TX circadian OR TX SCN OR TX chrono\* OR "clockwork"[Text Word] OR TX ((clock-synchronous OR clock-actuated OR clock-controlled) AND

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(work OR task\* OR job\*) OR TX shiftwork\* OR TX shift work\* OR TX "workday shifts" OR TX "shift system\*" OR TX "shift rotation\*" OR TX "night shift" OR TX "irregular working hour\*" OR TX "night work\*" OR TX "flexible working hour\*" OR TX "flexible work hour\*" OR TX "flexible working arrangement\*" OR TX "flexibilit\* in the scheduling of hour\* worked" OR TX "flexibilit\* in the amount of hour\* worked" OR TX ("flexibility" AND "working time") OR TX "irregular working hour\*" OR TX "irregular work hour\*" OR TX "irregular working time" OR TX ("working hour\*" AND (variabilit\* OR flexibilit\*)) OR TX flexitime OR TX flextime OR TX "on-call work\*" OR TX "on-call service" OR TX "emergency service" OR TX "on-call duty" OR TX "standby duty" OR TX "active standby" OR TX "standby service" OR TX "work-privacy-conflict" OR TX work privacy conflict\* OR TX job family relationship\* OR TX work family relationship\* OR TX "Family Work Relationship" OR TX "work-family- balance" OR TX work famil\* balance OR TX "work-life-balance" OR TX compatibility of family and job OR TX work-life balance OR TX (work\* AND (famil\* OR home OR leisure OR life OR nonwork OR non-work OR priva\* OR balanc\* OR compatibility OR conflict\* OR enhanc\* OR enrich\* OR facilitat\* OR interact\* OR interf\* OR spillover OR tension)) OR TX Schichtarbeit OR TX "Arbeit-Ruhe-Rhythmen" OR TX Arbeitswochenlänge OR TX lange Arbeitszeit OR TX Arbeitszeiteinteilung OR TX Nachtarbeit OR TX Schichtarbeit OR TX Schichtdienst OR TX Schichtplanung OR TX Überstunden OR TX Gleitzeit OR TX Nachtschicht OR TX Wechselschicht OR TX (rollierend\* AND (Schicht\* OR System)) OR TX "flexible Arbeitszeit\*" OR TX "Flexibilität der Arbeitszeit" OR TX (Arbeitszeit AND (Flexibilität OR Variabilität)) OR TX "Variabilität der Arbeitszeit" OR TX "Arbeitszeitflexibilisierung" OR TX Arbeitszeitgestaltung OR TX "Arbeit auf Abruf" OR TX Rufdienst OR TX Bereitschaftsdienst OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie\*" OR TX "Work-Life-Balance" OR TX "long working hour\*" OR TX "Twenty-four/seven" OR TX "extended shift" OR TX "extended shifts" OR TX "12-hour shift\*" OR TX "10-hour shifts\*" OR TX "7-day service\*" OR TX "irregular working hour\*" OR TX "work hour\*" OR TX hours worked OR TX job hours OR TX work time OR TX workhours OR TX working hours OR TX long hours OR TX overwork OR TX "extended work" OR TX working overtime OR TX overtime work OR TX overtime OR TX "long work hour\*" OR TX "long working hour\*" OR TX "compressed weeks" OR TX "job hour\*" OR TX Überstunden OR TX Mehrarbeit OR TX Wochenstunden OR TX "lange Arbeitszeit" OR TX "lange Arbeitszeiten" OR TX "12-Stunden-Schicht\*" OR TX "lange Schicht\*" OR TX "verlängerte Arbeitszeit" OR TX "verkürzte Wochen"

S12 S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11

S11 OR TX "compassion fatigue" OR TX ((emotion\*) AND (labor OR labour OR demand\* OR dissonance OR exhaustion OR work OR regulation)) OR TX "mental fatigue" OR TX satiation OR TX "emotional labor" OR TX "emotional labour" OR TX "emotion\* work" OR TX "emotion\* management" OR TX "emotional demand" OR TX "emotional dissonance" OR TX "emotion-rule dissonance" OR TX "emotion rule dissonance" OR TX "emotive dissonance" OR TX "Surface Acting" OR TX "Deep Acting" OR TX "emotion\* suppression\*" OR TX emotionale Belastung\* OR TX Emotionsregulation OR TX Emotionsmanagement OR TX Emotionsarbeit OR TX Gefühlsarbeit OR TX Gefuehlsarbeit OR TX Interaktionsarbeit OR TX "Emotionale Inanspruchnahme"

S10 OR TX qualification\* OR TX "job knowledge" OR TX "work education\*" OR TX education\* qualit\* OR TX professional competence\* OR TX technical expertise\* OR TX professional expertise\* OR TX "lack of expertise" OR TX job training OR TX "on-the-job training" OR TX "manpower training" OR TX occupational training\* OR TX (vocational AND (training\* OR education\*)) OR TX aspiration level\* OR TX knowledge level\* OR TX Qualifikation OR TX Überforderung OR TX Ueberforderung OR TX Unterforderung OR TX Einarbeitung OR TX Einweisung OR TX Anspruchsniveau OR TX Wissensstand OR TX Kenntnisstand OR TX "learning by doing" OR TX "Lernen am Arbeitsplatz" OR TX "Lernen im Arbeitsprozess"

S9 OR TX responsibility OR TX responsibilities OR TX "sense of responsibility" OR TX remit OR TX "area of responsibilit\*" OR TX "field\* of activity" OR TX "field\* of work" OR TX assignment OR TX job description OR TX "range\* of task\*" OR TX "diffusion of responsibility" OR TX role conflict\* OR TX professional\* identit\* OR TX "job role\*" OR TX occupational role\* OR TX "professional role\*" OR TX "work role\*" OR TX "command structure" OR TX command structures" OR TX "flat organisation" OR TX "flat organisations" OR TX "flat organization" OR TX "flat organizations" OR TX "horizontal organisation" OR TX "horizontal organisations" OR TX "horizontal organization" OR TX "horizontal organizations" OR TX level hierarch\* OR TX "no clear hierarch\*" OR TX "flat hierarch\*" OR TX "flat hierarchical structure\*" OR TX accountability OR TX Kompetenz\* OR TX Verantwortung OR TX "unklare Verantwortung" OR TX Verantwortungsdiffusion OR TX "kollektive Verantwortlichkeit" OR TX "mangelnde Hierarchie\*" OR TX "flache Hierarchie\*" OR TX Verantwortlichkeit

S8 OR TX information\* volume OR TX information-volume OR TX information\* quantit\* OR TX information\* qualit\* OR TX missing data OR TX "lack of information" OR TX missing information\* OR TX inadequate information\* OR TX "information overload" OR TX stimulus satiation OR TX overstimulation OR "sensory overload" OR TX "information system\*" OR TX data display OR TX Information\* OR TX (Information\* AND (Entdeckbarkeit OR Ablenkungsfreiheit OR Unterscheidbarkeit OR Interpretierbarkeit OR Kompaktheit OR Konsistenz)) OR TX Informationsgehalt OR TX Informationsqualität OR TX Informationsqualitaet OR TX Informationsangebot OR TX Informationsmenge OR TX "fehlende\* Information\*" OR TX Reizüberflutung OR TX Reizueberflutung OR TX Informationsdarstellung OR TX (Information AND Reizüberflutung)

S7 OR TX monotony OR TX task variety OR TX task variabilit\* OR TX repetitiveness OR TX "repetitive work" OR TX "repetitive task\*" OR TX "repetitive job\*" OR TX "monotonous work" OR TX "monotonous task\*" OR TX "monotonous job\*" OR TX Variabilität OR TX Variabilitaet OR TX Abwechslungsreichtum OR TX Aufgabenvariabilität OR TX Aufgabenvariabilitaet OR TX

	Aufgabenvielfalt OR TX Tätigkeitswechsel OR TX Taetigkeitswechsel OR TX Monotonie OR TX repetitive* Arbeit* OR TX repetitive* Tätigkeit* OR TX repetitive* Taetigkeit* OR monotone Tätigkeit* OR monotone Taetigkeit* OR TX monoton* Arbeit* OR TX kurze Takte
S6	OR TX job control OR TX job demand* OR TX "freedom of action" OR TX (freehand AND (work* OR job* OR task*)) OR TX "freedom to operate" OR TX decision latitude OR TX autonomy OR TX job crafting OR TX "influence at work" OR TX "influence on task" OR TX task order OR TX skill discretion OR TX job discretion OR TX boredom OR TX active job* OR TX Handlungsspielraum OR TX Entscheidungsspielraum OR TX Gestaltungsspielraum OR TX Entscheidungsautorität OR TX Tätigkeitsermesslen OR TX Taetigkeitsermesslen OR TX Autonomie OR TX Kontrollerleben
S5	TX job content OR TX job characteristic* OR TX Arbeitsinhalt OR TX Arbeitsaufgabe OR TX "self-managing work team*" OR TX job enrichment OR TX task complexit* OR TX work simplification OR TX "freedom of action" OR TX ((repetitiv* OR repetitious) AND (work OR task* OR job*)) OR TX "job rotation*" OR TX (monoton* AND (work* OR task* OR job*)) OR TX action regulation OR TX task identit* OR TX task signific* OR TX task order* OR TX job complexit* OR TX work complexit* OR TX Tayloris* OR TX Toyotis* OR TX "selfmanag* team*" OR TX "self-manag* work* team*" OR TX job enlargement* OR TX job rotation* OR TX "self-directed work group*" OR TX "self-managing work group*" OR TX autonom* group* OR TX "autonomous groups" OR TX "autonomous work group" OR TX "autonomous work groups" OR TX "self-directed work team*" OR TX "work team*" OR TX cross-functional team* OR TX Aufgabenerweiterung OR TX Aufgabenbereicherung OR TX Vollständigkeit OR TX vollständige Tätigkeit OR TX vollstaendige Taetigkeit OR TX (Einfluss AND Arbeitsinhalt OR Arbeitspensum) OR TX Ganzzeitlichkeit OR TX Handlungsregulation OR TX Tätigkeitsbewertung* OR TX Taetigkeitsbewertung* OR "vollständige Aufgabe*" OR TX "vollstaendige Aufgabe*" OR TX autonome Arbeitsgruppe* OR TX teilautonome Arbeitsgruppe*
S4	DE "JOB analysis" OR DE "TASK analysis" OR DE "TEAMS in the workplace" OR DE "EMPLOYEE empowerment" OR DE "SELF-directed work teams" OR DE "JOB enrichment" OR DE "INFORMATION resources management" OR DE "EMPLOYERS' liability" OR DE "OCCUPATIONAL roles" OR DE "JOB qualifications" OR DE "CORE competencies" OR DE "JOB skills" OR DE "OCCUPATIONAL training" OR DE "EMPLOYEE training" OR DE "VIOLENCE in the workplace" OR DE "EMOTIONAL labor" OR DE "INDUSTRIAL engineering" OR DE "WORK design" OR DE "WORK & leisure" OR DE "NIGHT work" OR DE "OVERTIME" OR DE "WORKING hours" OR DE "COMPRESSED workweek" OR DE "WORKFLOW" OR DE "SYSTEMS engineering" OR DE "EMPLOYEES' workload" OR DE "LABOR supply" OR DE "COMMUNICATION in organizations" OR DE "VIRTUAL work teams" OR DE "MULTINATIONAL work teams" OR DE "COWORKER relationships" OR DE "BULLYING in the workplace" OR DE "ANGER in the workplace" OR DE "ABUSIVE supervision (Work environment)" OR DE "SUPERIOR-subordinate relationship" OR DE "LEADER-member exchange theory" OR DE "OCCUPATIONAL roles" OR DE "EMPLOYEES' buildings & facilities" OR DE "WORK environment -- Psychological aspects" OR DE "WORKPLACE exposure to hazardous substances" OR DE "NOISE (Work environment)" OR DE "INDUSTRIAL noise" OR DE "LIGHTING" OR DE "OFFICE building lighting" OR DE "ERGONOMICS" OR DE "MANUFACTURING workstations" OR DE "QUIET rooms (Facilities)" OR DE "ERGONOMICS" OR DE "COMPUTER integrated manufacturing systems" OR DE "HUMAN-machine systems" OR DE "HUMAN-computer interaction" OR DE "MANAGEMENT information systems" OR DE "SIGNS & signboards" OR DE "COMMUTING" OR DE "WORK-life balance" OR DE "OCCUPATIONAL mobility" OR DE "FLEXIBLE work arrangements" OR DE "FLEXTIME" OR DE "FOUR day week" OR DE "JOB sharing" OR DE "PART-time employment" OR DE "INDUSTRIAL psychology" OR DE "WORK -- Psychological aspects" OR DE "QUALITY of work life" OR DE "JOB stress" OR DE "INDUSTRIAL safety & psychology"
S3	S1 OR S2
S2	DE "JOB stress" OR DE "BURNOUT (Psychology)" OR DE "WORK -- Psychological aspects"
S1	TX Burnout OR TX Job Stress OR TX (job AND stress) OR TX Work Stress OR TX (work AND stress) OR TX (stress AND psychological) OR TX psychological stress OR TX mental stress OR TX mental strain OR TX psychological strain OR TX work related stress OR TX work-related stress OR TX occupational stressor* OR TX ((mentale OR psychische) AND Beanspruchung) OR TX "psychische Belastung" OR TX (psychisch* AND Stress) OR TX "beruflicher Stress" OR TX (Beruf AND Stress) OR TX (berufsbedingt AND Stress) OR TX stress OR TX strain OR TX Belastung OR TX Beanspruchung OR TX ((mental OR psychisch) AND (beanspruchend OR belastend)) OR TX berufsbedingt* Stressor OR TX psychisch* Stressor*

**Table 15 Search strategy for PsycINFO**

Search	Query
S12	S10 AND S11 Eingrenzungen - Year of Publication: 2000-2019; Age Groups: Adolescence (13-17 yrs), Adulthood (18 yrs & older); Population Group: Human
S11	( TX ((small OR small-medium OR small-scale OR medium OR medium-sized OR medium sized OR mediumsized OR midsized OR mid-sized OR midsi* OR micro OR family OR families) AND (enterprise OR enterprises OR enterpri* OR busines* OR business OR businesses OR company OR companies OR workplace OR workplaces)) OR TX "small & medium-sized business" OR TX "small & medium-sized businesses" OR TX "family business" OR TX "family businesses" OR TX "family company" OR TX "family companies" OR TX " family-owned business" OR TX " family-owned businesses" OR TX "family owned business" OR TX "family owned businesses" OR TX "family firm" OR TX "family firms" OR TX Microenterprise* OR TX "family busines*" OR TX "family company" OR TX "family companies" OR TX "SME" OR TX "SMEs" OR TX "Kleine mittlere Unternehmen" OR TX ((klein* OR mittelständisch OR mittel OR mittlere*) AND (Unternehmen OR Betrieb* OR Firmen OR Firma OR Gewerbe)) OR TX "KMU" OR TX "Kleine Unternehmen" OR TX "Mittlere Unternehmen" OR TX "kleine AND mittlere Betriebe" OR TX "Klein- AND Mittelbetriebe" OR TX "KMB" OR TX "Klein- Mittelunternehmen" OR TX "klein* mittelgroß* Unternehmen" OR TX "Kleinstunternehmen" OR TX Familienunternehmen OR TX Familienbetrieb OR TX (Familien AND (Unternehmen OR Betrieb*)) OR TX Kleinstunternehmen ) OR ( DE "Small Businesses" OR DE "Family Business" )
S10	S7 OR S9
S9	S7 AND S8
S8	S1 OR 2 OR S3 OR S4 OR S5 OR S6
S7 (terms of stress)	( TX Burnout OR TX Job Stress OR TX (job AND stress) OR TX Work Stress OR TX (work AND stress) OR TX (stress AND psychological) OR TX psychological stress OR TX mental stress OR TX mental strain OR TX psychological strain OR TX work related stress OR TX work-related stress OR TX occupational stressor* OR TX ((mentale OR psychische) AND Beanspruchung) OR TX "psychische Belastung" OR TX (psychisch* AND Stress) OR TX "beruflicher Stress" OR TX (Beruf AND Stress) OR TX (berufsbedingt AND Stress) OR TX stress OR TX strain OR TX Belastung OR TX Beanspruchung OR TX ((mental OR psychisch) AND (beanspruchend OR belastend)) OR TX berufsbedingt* Stressor OR TX psychisch* Stressor* ) OR ( DE "Occupational Stress" OR DE "Psychological Stress" OR DE "Industrial and Organizational Psychology" )
S6	( TX "occupational mobility" OR TX "Job Mobility" OR TX "Mobility Occupational" OR TX "spatial mobility" OR TX commuting OR TX commute OR TX (work AND travel*) OR TX "business travel" OR TX "sales force" OR TX "field service" OR TX overnigher OR TX "mobile worker*" OR TX "adaptability personality" OR TX "Life-Work Imbalance" OR TX "work-life balance" OR TX "work-life-balance" OR TX "on-call work" OR TX "job insecurity" OR TX "job security" OR TX "employment uncertainty" OR TX "job uncertainty" OR TX "flexible work arrangement*" OR TX "atypical employment" OR TX "flexible employment" OR TX "alternative employment" OR TX "flexible employment" OR TX contract OR TX "temporary work" OR TX "temporary employment" OR TX flexicurity OR TX "flexible workers" OR TX "nonstandard work" OR TX "substandard job*" OR TX "nonstandard employment" OR TX "workplace restructuring" OR TX "part-time job*" OR TX "labor market segmentation" OR TX "temporary work" OR TX workaholism OR TX "workfamily-border" OR TX "work-home border" OR TX "border theory" OR TX "boundary flexibility" OR TX "boundary management" OR TX "boundary spanning" OR TX "boundary strategies" OR TX "boundary strength" OR "workfamily-border" OR "work-home border" OR TX dislimitation OR TX permeability OR TX segmentation OR TX "remote work" OR TX "telework" OR TX "working at home" OR TX "berufliche Mobilität" OR TX Berufsmobilität OR TX Mobilität OR TX "räumliche Mobilität" OR TX "mobile Arbeit" OR TX Pendeln OR TX Berufspendler OR TX "berufliches Pendeln" OR TX Wochenpendler* OR TX Tagespendler OR TX Pendelmobilität OR TX Außendienst OR TX erweiterte Erreichbarkeit OR TX Entgrenzung OR TX Durchlässigkeit OR TX Segmentierung OR TX "Grenz* Theorie" OR TX "Grenze zwischen Arbeit und Privatleben" OR TX Vereinbarkeitsstrategie OR TX Detachment OR Entgrenzung OR "Grenze zwischen Arbeit und Privatleben" OR "entgrenzte Arbeit" OR TX Zeitarbeit OR TX "Flexible Beschäftigungsverhältnisse" OR TX "Flexible Beschaeftigungsverhaeltnisse" OR TX Prekarisierung OR TX "atypische Verträge" OR TX "atypische Vertraege" OR TX "atypische Arbeitsform*" OR TX Telearbeit OR TX Prekarität OR TX Prekaritaet OR TX "prekäre Arbeit*" OR TX "prekaere Arbeit*" OR TX Leiharbeit OR TX Zeitarbeit OR TX "neue Arbeitsformen" OR TX "Flexibilisierung" ) OR ( TX "flexible work arrangements" OR TX flexible employ* OR TX "flexible employment contract*" OR TX "flexible work contract*" OR TX contingent employ* OR TX contingent work* OR TX atypical work* OR TX atypical employ* OR TX "non-standard work*" OR TX nonstandard work* OR TX "non-standard employ*" OR TX nonstandard employ* OR TX "non-regular employ*" OR TX "non-permanent employ*" OR TX nonpermanent employ* OR TX nontraditional employ* OR TX nontraditional occupation* OR TX "precarious work*" OR TX "precarious employ*" OR TX unstable work* OR TX unstable employ* OR TX "employment type*" OR TX employment contract* OR TX work contract* OR TX "temporary employment agency*" OR TX temporary employ* OR TX temporary work* OR TX "agency work*" OR TX multiple employ* OR TX "multiple job hold*" OR TX (moonlighting AND work) OR TX marginal employ* OR

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TX short-term contract\* OR TX short-term work\* OR TX "fixed-term contract\*" OR TX "fixed-term employ\*" OR TX "temporary work contract\*" OR TX "part-time staff" OR TX "part-time employ\*" OR TX "part-time work\*" OR TX self-employment OR TX "independent contractors" OR TX freelancer\* OR TX sole traders OR TX casual work\* OR TX casual employ\* OR casual job\* OR TX casual contract\* OR TX contract work\* OR TX seasonal work\* OR TX seasonal employ\* OR TX seasonal occupation\* OR TX multiple job\* OR TX Arbeitnehmerüberlassung OR TX "atypische Beschäftigung\*" OR TX "atypische Beschaeftigung\*" OR TX "atypische Arbeit\*" OR TX Normalarbeitsverhältnis OR TX "prekäre Beschäftigung\*" OR TX "prekaere Beschaeftigung\*" OR TX "flexible Arbeit\*" OR TX "flexible Beschäftigung\*" OR TX "flexible Beschaeftigung\*" OR TX Mehrfachbeschäftigung OR TX Mehrfachbeschaeftigung OR TX "geringfügige Beschäftigung" OR TX "geringfuegige Beschaeftigung" OR TX Minijob OR TX "geringfügig Beschäftigte" OR TX "geringfuegig Beschaeftigte" OR TX "Leiharbeit\*" OR TX "Zeitarbeit\*" OR TX Tagelöhner OR TX Tageloehner OR TX "befristet beschäftigt" OR TX "befristet beschaeftigt" OR TX Teilzeitarbeit OR TX Teilzeitbeschäftigung OR TX Teilzeitbeschaeftigung OR TX ((selbstständig\* OR selbststaendig AND (Arbeit\* OR Beschäftigung\* OR Beschaeftigung\*)) OR TX freiberufler\* ) OR ( TX "Job Family Relationship" OR TX "Work Family Relationship" OR TX "Work-family balance" OR TX "work-life-balance" OR TX "compatibility of family and job" OR TX "compatibility of family and profession" OR TX "compatibility of family and career" OR TX "work-life balance" OR TX "Family Work Relationship" OR TX ((work\*) AND (famil\* OR home OR leisure OR life OR nonwork OR non-work OR priva\*)) AND (balanc\* OR compatibility OR conflict\* OR enhanc\* OR enrich\* OR facilitat\* OR interact\* OR inter\* OR spillover OR tension)) OR TX Work-privacy-conflict OR TX "work privacy conflict" OR TX work-privacy conflict\* OR TX "WPC" OR TX work-home conflict OR TX workaholism OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie" OR TX "Work-Life-Balance" OR TX "Work-Life Balance" OR TX (Vereinbarkeit AND (Familie OR Beruf OR Arbeit))

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S5

( TX "working conditions" OR TX "work\* environment" OR TX Arbeitsbedingungen OR TX Arbeitsumgebung OR TX hazard\* OR TX "hazardous materials" OR TX "occupational exposure" OR TX ergonomics OR TX "noise level\*" OR TX nois\* OR TX acoustic\* OR TX sound\* OR TX "irrelevant speech" OR TX "background speech" OR TX Lärm OR TX Laerm OR TX Schall OR TX Hintergrundgeräusch OR TX Hintergrundgeraeusch OR TX Hintergrundbeschallung OR TX Hintergrundstimmen OR TX Lärmpegel OR TX Laermpegel OR TX Geräuschpegel OR TX Geraeuschpegel OR TX Nebengeräusch OR TX Nebengeraeusch OR TX vibration\* OR TX whole-body vibration\* OR TX hand-arm vibration\* OR TX "hand arm vibration\*" OR TX Vibration\* OR TX Ganzkörpervibration\* OR TX Ganzkoerpervibration\* OR TX Ganz-Körper-Vibration\* OR TX Ganzkörper-Vibrationen OR TX Ganzkoerper-Vibrationen OR TX „indoor climate\*" OR TX „indoor environment\*" OR TX "room climate\*" OR TX "indoor air temperatur\*" OR TX "indoor temperatur\*" OR TX "operative temperatur\*" OR TX "air velocity\*" OR TX "indoor air velocity\*" OR TX humidity\* OR „dry air" OR "moisture skin\*" OR "eye blink\* frequency\*" OR "office eye syndrom\*" OR („thermal comfort\*" OR „thermal comfort\* room\*" OR „comfortable climate\*" OR "draught risk" OR turbulence\* OR surface temperature" OR "radiant temperature asymmetry" OR "radiant temperature" OR "Temperature Perception") OR ("natural ventilation\*" OR "air-condition\*" OR "aircondition\*" OR "air condition\*" OR cooling\* OR ventilation\* OR HVAC heat\* OR "heat stress" OR "heat strain\*" OR "heat radiation\*" OR cold\* OR "cold\* stress" OR acclimatization\* OR TX Effektivtemperatur OR TX Normal-Effektivtemperatur OR TX Basis-Effektivtemperatur OR TX Raumtemperatur OR TX Raumlufttemperatur OR Oberflächentemperatur\* OR TX Oberflaechentemperatur\* OR TX Oberflaechentemperatur OR TX Zugluft\* OR TX "störender Luftzug\*" OR TX "stoerender Luftzug\*" OR TX Raumluftgeschwindigkeit\* OR TX Klimatechnik\* OR TX Turbulenz\* OR Strahlungsasymmetrie\* OR Klimatechnik\* OR Luftfeuchtigkeit\* OR "trockene Luft" OR Raumklima\* OR „thermischer Raumkomfort" OR TX "raumklimatisch\* Bedingung\*" OR TX Raumklimasituation OR TX Raumklimasituationen OR TX Zugluftisiko\* OR TX Behaglichkeit\* OR TX Hitzestress OR TX Wärmestrahlung OR TX Waermestrahlung OR TX Kälte OR TX Kaelte OR TX Akklimatisation OR TX Akklimatisierung OR TX Hitze OR TX ((light\* OR illumi\* OR \*photo\* OR lumi\*) AND (view OR discomfort OR eyestrain OR asthenop\* OR complain\* OR window\* OR controldisruption OR desynchronisation\* OR disturbance OR \*synchronisation\* OR circadian OR SCN OR chrono\* OR clock OR Suprachiasmatic OR sleep OR \*work\* OR occupation\* OR office OR deprivation OR entrain\* OR misalign\*)) OR TX Beleuchtung OR TX Lichtwirkung OR TX Licht OR TX Zeitgeber OR TX Disruption ) OR ( TX Ergonomics OR TX "human factors engineering" OR TX "physical stress" OR TX "physical factor" OR TX "physical factors" OR TX "physical work" OR TX Ergonomie OR TX ergonomische Gestaltung OR TX Arbeitsplatzgestaltung OR TX "körperliche Arbeit" OR TX "körperliches Arbeiten" OR TX "physische Arbeit" OR TX physische Faktoren ) OR ( TX "process control" OR TX "supervisory control" OR TX "video display" OR TX "visual display" OR TX "video display units" OR TX "computer terminals" OR TX "data display" OR TX "assembly line" OR TX "conveyor belt" OR TX "working space" OR TX workspace OR TX "work space\*" OR TX "work equipment" OR TX "ergonomic\* device\*" OR TX "working materials" OR TX "work material\*" OR TX "work tool\*" OR TX "working tool\*" OR TX Mensch-Computer-Interaktion OR TX "computerunterstützte Entscheidungshilfen" OR TX "automatisierte Informationsverarbeitung" OR TX Automation OR TX Prozesskontrolle OR TX "überwachende Kontrolle" OR TX "ueberwachende Kontrolle" OR TX "visuelle Informationsdarbietung" OR TX Fließband OR TX "ungünstige Arbeitsräume" OR TX unguenstige Arbeitsraeume OR TX räumliche Enge OR TX raemliche Enge OR TX (Gestaltung AND Signale\* OR Hinweise\*) ) OR ( TX "human-machine System\*" OR TX "human machine\* System\*" OR TX "man-machine" OR TX telecooperation OR TX "man-machine systems" OR TX "man machine system\*" OR TX "human-computer interaction" OR TX "human-robot interaction" OR TX "human-robot system" OR TX "human-robot cooperation" OR TX "human engineering" OR TX "human factors engineering" OR TX "expert systems" OR TX "decision support system\*" OR TX "automatic data processing" OR TX automation OR TX "computer-based work" OR TX "user performance" OR TX screen OR TX "data-entry task" OR TX "data entry task" OR TX computer\* OR TX "Intelligent Systems" OR TX "information technology" OR TX "information systems" OR TX "communication systems" OR TX "communication technology" OR TX "communications

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media" OR TX "computer mediated communication" OR "electronic communication" OR "electronic device\*" OR "mobile device\*" OR "mobile phone" OR "digital telephone" OR Digitaltelefon OR "wireless device" OR "wireless telephone" OR TX "cell phone" OR TX "cell telephone" OR TX "cellular phone" OR TX handheld OR "portable device" OR TX pager OR TX smartphone OR TX blackberry OR TX "iPhone" OR TX chat OR TX "electronic mail\*" OR TX "e-mail\*" OR TX MMS OR TX "instant messag\*" OR TX "short messag\*" OR TX "SMS" OR TX "ict" OR TX "IKT" OR TX "ict use" OR TX "Information media" OR TX "Information and communication media" OR TX "information technology" OR TX "IOS" OR TX android OR TX "social media" OR TX supplemental OR TX telecommuting OR TX "use of technology" OR TX "strategies of compatibility" OR TX "software usability" OR TX software ergonomics OR TX "user interface\*" OR TX "interface design" OR TX visualization OR TX visualisation OR TX visualisation system OR TX visualization system OR TX dialogue OR TX dialog OR TX "computer input device\*" OR TX "computer output device\*" OR TX screen OR TX display OR TX mouse OR TX keyboard OR TX track ball OR TX tablet OR TX touch screen OR TX scanner OR TX "human computer interaction" OR TX usability OR TX Mensch-Computer-Interaktion OR TX "Mensch Computer Interaktion" OR TX Arbeitsmittel OR TX "Mensch-Maschine-Systeme" OR TX "Mensch Maschine Systeme\*" OR TX "Mensch-Roboter-Interaktion" OR TX "Mensch Roboter Interaktion" OR TX "Mensch-Roboter-Systeme" OR TX "Mensch Roboter Systeme" OR TX "Mensch-Roboter-Kooperation" OR TX "Mensch Roboter Kooperation" OR TX Ergonomie OR TX Expertensystem OR TX Software-Ergonomie OR TX Kommunikationssysteme OR TX Kommunikationstechnologien OR TX "Informations- und Kommunikationstechnologien" OR TX Mobiltelefon OR TX Handy OR TX Digitaltelefon OR TX ((Gerät\* OR Geraet\*) AND (tragbare\* OR schnurlos\* OR kabellos OR mobil\* OR elektronisch\*)) OR TX Handgerät OR TX Handgeraet OR TX Mobilfunkempfänger OR TX Mobilfunkempfaenger OR TX Kommunikationsmedien OR TX "computergestützte Kommunikation" OR TX "computergestuetzte Kommunikation" OR TX "elektronische Kommunikation" OR TX Telekommunikation OR TX Informationstechnologie OR TX Informationssysteme OR TX "Informations und Kommunikationsmedien" OR TX Informationsmedien OR TX "IKT Nutzung" OR TX erreichbar OR TX Erreichbarkeit OR TX Kurznachrichten OR TX Bildnachrichten OR TX "elektronische Post" OR TX Kurznachrichtendienst OR TX "soziale Medien" OR TX "Technologie Nutzung OR TX „Software Gebrauchtauglichkeit" OR TX Software-Ergonomie OR TX Software OR TX Benutzerschnittstelle OR TX Dialoggestaltung OR TX Informationsdarstellung OR TX Benutzerführung OR TX Benutzerfuehrung OR TX Dialogführung OR TX Dialogfuehrung OR TX "Computer Eingabegerät\*" OR TX "Computer Ausgabegerät\*" OR TX "Computer Eingabegeraet\*" OR TX "Computer Ausgabegeraet\*" OR TX Bildschirm OR TX "visuelle Informationsdarbietung" OR TX Maus OR TX Tastatur OR TX Trackball OR TX Tablet OR TX Touchscreen OR TX Scanner OR TX "Mensch-Computer-Interaktion" OR TX Informationssystem\* )

S4 ( TX social networking OR TX social environment\* OR TX workplace team\* OR TX "demand control support" OR TX "social support" OR TX ((leader OR co-worker OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague\*) AND support) OR TX "social buffering" OR TX "social relations" OR TX coworker relationship OR TX "social relation" OR TX "social relationship" OR TX "social relationships" OR TX "interpersonal relation" OR TX "interpersonal relations" OR TX "interpersonal relationship" OR TX "interpersonal relationships" OR TX "competitive behavior" OR TX "competitive behaviour" OR TX mobbing OR TX bullying OR TX "workplace bullying" OR TX harassment OR TX hostile OR TX hostility OR TX teasing OR TX "aggressive behavior" OR TX "aggressive behaviour" OR "workplace violence" OR TX victimization OR TX victimisation OR TX "social isolation" OR TX ((social OR workplace OR team) AND (climate OR conflict OR conflicts OR "social stress\*") OR TX "supervisor employee interaction" OR TX ((co-worker OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague) AND interaction) OR TX "group cohesion" OR TX cooperation OR TX cooperative OR TX collaboration OR TX collaborative OR TX "team work" OR TX "work teams" OR TX "soziale Beziehung\*" OR TX "Soziale Unterstützung" OR TX Mitarbeiterunterstützung OR TX ((Mitarbeiter OR Kollege OR Kollegen OR Vorgesetzter OR Vorgesetzte) AND (Unterstützung OR Unterstuetzung) OR TX "zwischenmenschliche Beziehung" OR TX "zwischenmenschliche Beziehungen" OR TX Gruppenzusammenhalt OR TX Teamzusammenhalt OR TX "soziales Klima" OR TX Teamklima OR TX "Klima im Team" OR TX Arbeitsklima OR TX Belästigung\* OR TX Belaestigung\* OR TX Feindseligkeit OR TX Feindseligkeiten OR TX "aggressives Verhalten" OR TX "Gewalt am Arbeitsplatz" OR TX Mobbing OR TX Schikane OR TX schikanieren OR TX "soziale Isolation" OR TX Ausgrenzung OR TX Ausgrenzungen OR TX Konflikt OR TX Konflikte OR TX sozialer Stress\* ) OR ( TX "supervisor employee interaction" OR TX "labor management relation\*" OR TX "labour management relation" OR TX "leadership" OR TX supervisor OR TX middle manag\* OR TX middle level manag\* OR TX "manager employee interaction" OR TX "manager-employee-interaction" OR TX ((leader OR leadership OR supervisor OR supervisory) AND (qualities OR quality OR style OR behavior OR behaviour OR skill OR skills OR characteristics OR characteristic OR traits OR attributes OR personality OR attitude OR abu-sive OR destructive OR aggressive OR negative OR tyrannic\* OR undermining OR psychopathic OR toxic OR despotic OR "laissez faire" OR passive OR narcissistic OR transformational OR transactional OR charismatic OR "health-specific" OR "health-domain" OR "health-oriented" OR authentic OR "ethical" OR shared OR servant OR distributed OR collective OR consensus OR climate)) OR TX "abusive supervision" OR TX "petty tyranny" OR TX "petty authority" OR TX "petty power" OR TX "leader member exchange" OR TX "leader-member-exchange" OR TX "LMX" OR TX "superior-subordinate relationship" OR TX "superior subordinate relationship" OR TX Rückmeldung OR TX Rueckmeldung OR TX "Kenntnis der Ergebnisse" OR TX Monitoring OR TX Selbstregulation OR TX Überwachen OR TX Ueberwachen OR TX Vorgesetzten-Untergebenen-Interaktion OR TX Führungsstil OR TX Fuehrungsstil OR TX Führung OR TX Fuehrung OR TX "Remote Leadership" OR TX "Vorgesetzte\*" OR TX Teamleiter OR TX Teamleitung OR TX "gesunde Führung" OR TX "gesunde Fuehrung" OR TX "gesund Führen" OR TX "ungesunde Fuehrung" OR TX "gesund Fuehren" OR TX "ungesunde Fuehrung" OR TX ((auritär\* OR autoritaer\* OR

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direktiv\* OR kooperativ\* OR partizipativ\* OR coachend\* OR situativ\* OR narzistisch\* OR gesundheitsorientier\* OR authentisch\* OR geteilt\* OR tyrannisch\* OR aggressiv\* OR charismatisch\* OR willkürlich\* OR willkuerlich\* OR engstirnig\*) AND (Führung OR Fuehrung OR Führungsstil OR Fuehrungsstil OR Vorgesetzte\*) OR TX feedback OR TX "knowledge of result\*" OR TX "performance monitoring" OR TX "task\* monitoring" OR TX "supervisory monitoring" OR TX "supervisor monitoring" OR TX "work monitoring" OR TX "job monitoring" OR TX "monitoring at work" OR TX self-regulat\* OR TX "action regulation" OR TX "effort reward" OR TX "effort-reward" OR TX "effort reward imbalance" OR TX "effort-reward imbalance" OR TX overcommitment OR TX "gratification crisis" OR TX justice OR TX injustice OR TX fairness OR TX "relational justice" OR TX "organizational justice" OR TX "organizational injustice" OR TX "organizational justice" OR TX "organisational injustice" OR TX "distributive justice" OR TX "distributive injustice" OR TX "procedural justice" OR TX "procedural injustice" OR TX "interactional justice" OR TX "interactional injustice" OR TX Rückmeldung OR TX Rueckmeldung OR TX Handlungsregulation\* OR TX Gratifikationskrise OR TX Ungerechtigkeit OR TX "organisationale Gerechtigkeit" OR TX "organisationale Ungerechtigkeit" OR TX "fehlende Anerkennung" OR TX Entlohnung OR TX Wertschätzung OR TX Wertschaetzung OR TX Feedback OR TX Anerkennung OR TX Gerechtigkeit OR TX Fairness OR TX Glaubwürdigkeit OR TX Glaubwuerdigkeit OR TX Verlässlichkeit OR TX Verlaesslichkeit )

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S3 ( TX "work week length" OR TX "work scheduling" OR TX "personnel staffing and scheduling" OR TX "work rest cycle\*" OR TX "work schedule tolerance" OR TX fixed-term employment OR TX leisure OR TX night work OR TX controldisruption OR TX desynchronisation\* OR TX desynchronization\* OR TX resynchronisation OR TX resynchronization OR TX disturbance OR TX synchronisation\* OR TX synchronization OR TX circadian OR TX SCN OR TX chrono\* OR "clockwork"[Text Word] OR TX ((clock-synchronous OR clock-actuated OR clock-controlled) AND (work OR task\* OR job\*)) OR TX shiftwork\* OR TX shift work\* OR TX "workday shifts" OR TX "shift system\*" OR TX "shift rotation\*" OR TX "night shift" OR TX "irregular working hour\*" OR TX night work\* OR TX "flexible working hour\*" OR TX "flexible work hour\*" OR TX "flexible working arrangement\*" OR TX "flexibilit\* in the scheduling of hour\* worked" OR TX "flexibilit\* in the amount of hour\* worked" OR TX ("flexibility" AND "working time") OR TX "irregular working hour\*" OR TX "irregular work hour\*" OR TX "irregular working time" OR TX ("working hour\*" AND (variabilit\* OR flexibilit\*)) OR TX flexitime OR TX flextime OR TX "on-call work\*" OR TX "on-call service" OR TX "emergency service" OR TX "on-call duty" OR TX "standby duty" OR TX "active standby" OR TX "standby service" OR TX "work-privacy-conflict" OR TX work privacy conflict\* OR TX job family relationship\* OR TX work family relationship\* OR TX "Family Work Relationship" OR TX "work-family- balance" OR TX work famil\* balance OR TX "work-life-balance" OR TX compatibility of family and job OR TX work-life balance OR TX (work\* AND (famil\* OR home OR leisure OR life OR nonwork OR non-work OR priva\* OR balanc\* OR compatibility OR conflict\* OR enhanc\* OR enrich\* OR facilitat\* OR interact\* OR interf\* OR spillover OR tension)) OR TX Schichtarbeit OR TX "Arbeit-Ruhe-Rhythmen" OR TX Arbeitswochenlänge OR TX lange Arbeitszeit OR TX Arbeitszeiteinteilung OR TX Nachtarbeit OR TX Schichtarbeit OR TX Schichtdienst OR TX Schichtplanung OR TX Überstunden OR TX Gleitzeit OR TX Nachtschicht OR TX Wechselschicht OR TX (rollierend\* AND (Schicht\* OR System)) OR TX "flexible Arbeitszeit\*" OR TX "Flexibilität der Arbeitszeit" OR TX (Arbeitszeit AND (Flexibilität OR Variabilität)) OR TX "Variabilität der Arbeitszeit" OR TX "Arbeitszeitflexibilisierung" OR TX Arbeitszeitgestaltung OR TX "Arbeit auf Abruf" OR TX Rufdienst OR TX Bereitschaftsdienst OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie\*" OR TX "Work-Life-Balance" OR TX "long working hour\*" OR TX "Twenty-four/seven" OR TX "extended shift" OR TX "extended shifts" OR TX "12-hour shift\*" OR TX "10-hour shifts\*" OR TX "7-day service\*" OR TX "irregular working hour\*" OR TX "work hour\*" OR TX hours worked OR TX job hours OR TX work time OR TX workhours OR TX working hours OR TX long hours OR TX overwork OR TX "extended work" OR TX working overtime OR TX overtime work OR TX overtime OR TX "long work hour\*" OR TX "long working hour\*" OR TX "compressed weeks" OR TX "job hour\*" OR TX Überstunden OR TX Mehrarbeit OR TX Wochenstunden OR TX "lange Arbeitszeit" OR TX "lange Arbeitszeiten" OR TX "12-Stunden-Schicht\*" OR TX "lange Schicht\*" OR TX "verlängerte Arbeitszeit" OR TX "verkürzte Wochen" OR TX "break time\*" OR TX intermission\* OR TX intermittent breaks OR TX intermittent rest OR TX lull OR TX lulls OR TX "non-working time\*" OR TX "work to rest" OR TX "off time\*" OR TX off-time OR TX pausing OR TX recess OR TX "recovery period\*" OR TX "recovery time\*" OR TX "rest break" OR TX "rest breaks" OR TX "rest pause\*" OR TX "sufficient break\*" OR TX "sufficient rest\*" OR TX "time out\*" OR TX work break\* OR TX work pause\* OR TX work rest OR TX recovery opportunity OR TX recovery opportunities OR TX pause OR TX pauses OR TX repose\* OR TX respite\* OR TX "break schedule\*" OR TX "rest cycle\*" OR TX "rest schedule\*" OR TX "amount of rest" OR TX "number\* of breaks" OR TX break\* frequenc OR TX rest frequency OR TX rest frequencies OR TX break period\* OR TX brief pause\* OR TX brief rest OR TX "long break" OR TX "long breaks" OR TX "long pause\*" OR TX "long rest\*" OR TX "micro break\*" OR TX microbreak\* OR TX "mini break\*" OR TX "pause\* length\*" OR TX "pause\* duration\*" OR TX "rest allowance\*" OR TX rest duration OR TX rest length OR TX rest period\* OR TX short break\* OR TX break organization\* OR TX break organisation\* OR TX "break\* structure\*" OR TX "pause\* pattern\*" OR TX "rest design\*" OR TX "rest interval\*" OR TX "rest pattern\*" OR TX "planned rest\*" OR TX "regular break\*" OR TX "regular rest\*" OR TX "scheduled break\*" OR TX "scheduled rest\*" OR TX "active break\*" OR TX "active pause\*" OR TX "active recover\*" OR TX "active rest" OR TX "brief exercise\*" OR TX "exercise break" OR TX "exercise\* breaks" OR TX "exercise rest" OR TX "exercise rests" OR TX stretching exercise\* OR TX afternoon nap\* OR TX passive recovery OR TX power nap\* OR TX relaxation time\* OR TX "sit-down" OR TX breather\* OR TX nap OR TX napping\* OR TX naps OR TX siesta\* OR TX slumber\* OR TX snooze\* OR TX "coffee break" OR TX "coffee breaks" OR TX "tea break\*" OR TX "smoking breaks" OR TX "lunch break" OR TX "lunch breaks" OR TX "lunch hour\*" OR TX "lunchtime\*" OR TX "lunch time\*" OR TX "lunch-time" OR TX "meal breas" OR TX "midday break" OR TX "morning break" OR TX "meal time\*" OR TX mealtime\* OR TX "break room\*" OR TX "recovery room\*" OR TX "missed breaks" OR TX "missed breaks" OR TX "recovery time" OR TX Schlaf\* OR TX Erholung OR TX

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(Ruhe\* NOT Ruhestand\*) OR TX Paus\* OR TX Rast\* OR TX "Arbeit-Ruhe-Rhythmen" OR TX Nap\* OR TX Frühstück\* OR TX Fruestueck\* OR TX Auszeit OR TX Schlummer\* OR TX Arbeitspause\* OR TX Kurzpaus\* OR TX Mittagspause\* OR TX Dosen OR TX Doesen OR TX Mittagessen OR TX stretching OR TX Vesper\* OR TX Atempause\* OR TX Mittagsschlaf\* OR TX Mittagsschläfchen OR TX Mittagsschlaefchen OR TX Bewegungspau\* OR TX Arbeits-Erholungs\* OR TX Kaffeepaus\* OR TX Nickerchen OR TX Zigarettenpause\* OR TX Regenerationsphase\* OR TX Imbiss\* OR TX Verschnaufpause\* OR TX Regenerationspaus\* OR TX Auszeit OR TX Büroschlaf\* OR TX Buereschlaf\* OR TX Büroschläfchen OR TX Buereschlaefchen OR TX Pausenregime ) OR ( TX "task performance and analysis" OR TX workload OR TX workflow OR TX "qualitative workload" OR TX "quantitative workload" OR TX "time pressure" OR TX "mental demands" OR TX "mental demand" OR TX "job demand\*" OR TX "job control" OR TX interruption OR TX interrupt\* OR TX intrusion\* OR TX distraction\* OR TX disturbance OR TX "being under pressure" OR TX "under pressure" OR TX "fluctuating workload\*" OR TX "forced pacing" OR TX "hectic work" OR TX "speed of work" OR TX "temporal demand\*" OR TX "time demand\*" OR TX "time pressure" OR TX "time strain" OR TX "too much work" OR TX "quantitative demand\*" OR TX "quality demand\*" OR TX "work quantity" OR TX "work complexity" OR TX "work demand\*" OR TX "work intensity" OR TX "work intensification" OR TX "work overload" OR TX "work pace" OR TX "work pressure" OR TX "work speed" OR TX "mental workload" OR TX "work load" OR TX "labor intensity" OR TX "labour intensity" OR TX "job strain" OR TX "work cycle" OR TX "work-cycle" OR TX "paced work" OR TX "line work" OR TX "line-work" OR TX "clocked work" OR TX "clocked-work" OR TX "work intermissions" OR TX "electronic communication" OR TX communication OR TX collaboration OR TX coloboration OR TX "organizational climate" OR TX "psychosocial work environment" OR TX eteams OR TX E-Teams OR TX "virtual work teams" OR TX "virtual work team" OR TX "virtual team\*" OR TX VTEAMS OR TX v-team\* OR TX "remote leadership" OR TX Gruppenkohäsion OR TX Gruppenkohaesion OR TX Kooperation OR TX Zusammenarbeit OR TX "virtuelle Teams" OR TX "Arbeitsklima" OR TX Kommunikation" OR TX Zeitdruck OR TX hohe Arbeitsintensität OR TX Arbeitsintensitaet OR TX Störungen OR TX Stoerungen OR TX Unterbrechungen OR TX hohe Taktbindung )

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S2 ( TX job content OR TX job characteristic\* OR TX Arbeitsinhalt OR TX Arbeitsaufgabe OR TX "self-managing work team\*" OR TX job enrichment OR TX task complexit\* OR TX work simplification OR TX "freedom of action" OR TX ((repetitiv\* OR repetitious) AND (work OR task\* OR job\*)) OR TX "job rotation\*" OR TX (monoton\* AND (work\* OR task\* OR job\*)) OR TX action regulation OR TX task identit\* OR TX task signific\* OR TX task order\* OR TX job complexit\* OR TX work complexit\* OR TX Tayloris\* OR TX Toyotis\* OR TX "selfmanag\* team\*" OR TX "self-manag\* work\* team\*" OR TX job enlargement\* OR TX job rotation\* OR TX "self-directed work group\*" OR TX "self-managing work group\*" OR TX autonom\* group\* OR TX "autonomous groups" OR TX "autonomous work group" OR TX "autonomous work groups" OR TX "self-directed work team\*" OR TX "work team\*" OR TX cross-functional team\* OR TX Aufgabenerweiterung OR TX Aufgabenbereicherung OR TX Vollständigkeit OR TX vollständige Tätigkeit OR TX vollstaendige Taetigkeit OR TX (Einfluss AND Arbeitsinhalt OR Arbeitspensum) OR TX Ganzheitlichkeit OR TX Handlungsregulation OR TX Tätigkeitsbewertung\* OR TX Taetigkeitsbewertung\* OR "vollständige Aufgabe\*" OR TX "vollstaendige Aufgabe\*" OR TX autonome Arbeitsgruppe\* OR TX teilautonome Arbeitsgruppe\* ) OR ( TX job control OR TX job demand\* OR TX "freedom of action" OR TX (freehand AND (work\* OR job\* OR task\*)) OR TX "freedom to operate" OR TX decision latitude OR TX autonomy OR TX job crafting OR TX "influence at work" OR TX "influence on task" OR TX task order OR TX skill discretion OR TX job discretion OR TX boredom OR TX active job\* OR TX Handlungsspielraum OR TX Entscheidungsspielraum OR TX Gestaltungsspielraum OR TX Entscheidungsautorität OR TX Tätigkeitsermessen OR TX Taetigkeitsermessen OR TX Autonomie OR TX Kontrollerleben ) OR ( TX monotony OR TX task variety OR TX task variabilit\* OR TX repetitiveness OR TX "repetitive work" OR TX "repetitive task\*" OR TX "repetitive job\*" OR TX "monotonous work" OR TX "monotonous task\*" OR TX "monotonous job\*" OR TX Variabilität OR TX Variabilitaet OR TX Abwechslungsreichtum OR TX Aufgabenvariabilität OR TX Aufgabenvariabilitaet OR TX Aufgabenvielfalt OR TX Tätigkeitswechsel OR TX Taetigkeitswechsel OR TX Monotonie OR TX repetitive\* Arbeit\* OR TX repetitive\* Tätigkeit\* OR TX repetitive\* Taetigkeit\* OR monotone Tätigkeit\* OR monotone Taetigkeit\* OR TX monoton\* Arbeit\* OR TX kurze Takte ) OR ( TX information\* volume OR TX information-volume OR TX information\* quantit\* OR TX information\* qualit\* OR TX missing data OR TX "lack of information" OR TX missing information\* OR TX inadequate information\* OR TX "information overload" OR TX stimulus satiation OR TX overstimulation OR "sensory overload" OR TX "information system\*" OR TX data display OR TX Information\* OR TX (Information\* AND (Entdeckbarkeit OR Ablenkungsfreiheit OR Unterscheidbarkeit OR Interpretierbarkeit OR Kompaktheit OR Konsistenz)) OR TX Informationsgehalt OR TX Informationsqualität OR TX Informationsqualitaet OR TX Informationsangebot OR TX Informationsmenge OR TX "fehlende\* Information\*" OR TX Reizüberflutung OR TX Reizueberflutung OR TX Informationsdarstellung OR TX (Information AND Reizüberflutung ) OR ( TX responsibility OR TX responsibilities OR TX "sense of responsibility" OR TX remit OR TX "area of responsibilit\*" OR TX "field\* of activity" OR TX "field\* of work" OR TX assignment OR TX job description OR TX "range\* of task\*" OR TX "diffusion of responsibility" OR TX role conflict\* OR TX professional\* identit\* OR TX "job role\*" OR TX occupational role\* OR TX "professional role\*" OR TX "work role\*" OR TX "command structure" OR TX command structures" OR TX "flat organisation" OR TX "flat organisations" OR TX "flat organization" OR TX "flat organizations" OR TX "horizontal organisation" OR TX "horizontal organisations" OR TX "horizontal organization" OR TX "horizontal organizations" OR TX level hierarch\* OR TX "no clear hierarch\*" OR TX "flat hierarch\*" OR TX "flat hierarchical structure\*" OR TX accountability OR TX Kompetenz\* OR TX Verantwortung OR TX "unklare Verantwortung" OR TX Verantwortungsdiffusion OR TX "kollektive Verantwortlichkeit" OR TX "mangelnde Hierarchie\*" OR TX "flache Hierarchie\*" OR TX Verantwortlichkeit ) OR ( TX qualification\* OR TX "job knowledge" OR TX "work education\*" OR TX education\* qualit\* OR TX professional competence\* OR TX technical expertise\* OR TX professional expertise\* OR TX "lack of expertise" OR TX job training OR TX "on-the-job training" OR TX "manpower training" OR TX occupational training\* OR TX (vocational AND (training\* OR education\*)) OR TX aspiration

level\* OR TX knowledge level\* OR TX Qualifikation OR TX Überforderung OR TX Ueberforderung OR TX Unterforderung OR TX Einarbeitung OR TX Einweisung OR TX Anspruchsniveau OR TX Wissensstand OR TX Kenntnisstand OR TX "learning by doing" OR TX "Lernen am Arbeitsplatz" OR TX "Lernen im Arbeitsprozess" ) OR ( TX "compassion fatigue" OR TX ((emotion\*) AND (labor OR labour OR demand\* OR dissonance OR exhaustion OR work OR regulation)) OR TX "mental fatigue" OR TX satiation OR TX "emotional labor" OR TX "emotional labour" OR TX "emotion\* work" OR TX "emotion\* management" OR TX "emotional demand" OR TX "emotional dissonance" OR TX "emotion-rule dissonance" OR TX "emotion rule dissonance" OR TX "emotive dissonance" OR TX "Surface Acting" OR TX "Deep Acting" OR TX "emotion\* suppression\*" OR TX emotionale Belastung\* OR TX Emotionsregulation OR TX Emotionsmanagement OR TX Emotionsarbeit OR TX Gefühlsarbeit OR TX Gefuehlsarbeit OR TX Interaktionsarbeit OR TX "Emotionale Inanspruchnahme" )

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S1 DE "Job Characteristics" OR DE "Quality of Work Life" OR DE "Task Complexity" OR DE "Self-Managing Work Teams" OR DE "Monotony" OR DE "Boredom" OR DE "Information" OR DE "Participative Management" OR DE "Responsibility" OR DE "Accountability" OR DE "Role Conflicts" OR DE "Professional Role" OR DE "Role Perception" OR DE "Job Knowledge" OR DE "Workplace Violence" OR DE "Emotional Control" OR DE "Compassion Fatigue" OR DE "Work Scheduling" OR DE "Work Week Length" OR DE "Workday Shifts" OR DE "Work Rest Cycles" OR DE "Task Complexity" OR DE "Work Load" OR DE "Downsizing" OR DE "Electronic Communication" OR DE "Communication Systems" OR DE "Virtual Teams" OR DE "Telecommuting" OR DE "Social Support" OR DE "Cooperation" OR DE "Computer Mediated Communication" OR DE "Employee Interaction" OR DE "Bullying" OR DE "Cyberbullying" OR DE "Group Cohesion" OR DE "Leadership Style" OR DE "Leadership Qualities" OR DE "Leader Member Exchange Theory" OR DE "Role Conflicts" OR DE "Professional Role" OR DE "Role Perception" OR DE "Working Conditions" OR DE "Noise Levels (Work Areas)" OR DE "Occupational Exposure" OR DE "Noise Effects" OR DE "Luminance" OR DE "Hazardous Materials" OR DE "Human Factors Engineering" OR DE "Working Space" OR DE "Quality of Work Life" OR DE "Human Machine Systems Design" OR DE "Human Machine Systems" OR DE "Computer Applications" OR DE "Work-Life Balance" OR DE "Occupational Mobility" OR DE "Family Work Relationship"

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**Table 16 Search Strategy for PSYINDEX**

S12	S1 AND S11
S11	S9 OR S10
S10	S8 AND S9
S9	( TX Burnout OR TX Job Stress OR TX (job AND stress) OR TX Work Stress OR TX (work AND stress) OR TX (stress AND psychological) OR TX psychological stress OR TX mental stress OR TX mental strain OR TX psychological strain OR TX work related stress OR TX work-related stress OR TX occupational stressor* OR TX ((mentale OR psychische) AND Beanspruchung) OR TX "psychische Belastung" OR TX (psychisch* AND Stress) OR TX "beruflicher Stress" OR TX (Beruf AND Stress) OR TX (berufsbedingt AND Stress) OR TX stress OR TX strain OR TX Belastung OR TX Beanspruchung OR TX ((mental OR psychisch) AND (beanspruchend OR belastend)) OR TX berufsbeding* Stressor OR TX psychisch* Stressor* ) OR ( DE "Occupational Stress" OR DE "Psychological Stress" )
S8	S2 OR S3 OR S4 OR S5 OR S6 OR S7
S7	DE "Job Characteristics" OR DE "Quality of Work Life" OR DE "Task Complexity" OR DE "Self-Managing Work Teams" OR DE "Monotony" OR DE "Boredom" OR DE "Information" OR DE "Participative Management" OR DE "Responsibility" OR DE "Accountability" OR DE "Role Conflicts" OR DE "Professional Role" OR DE "Role Perception" OR DE "Job Knowledge" OR DE "Workplace Violence" OR DE "Emotional Control" OR DE "Compassion Fatigue" OR DE "Work Scheduling" OR DE "Work Week Length" OR DE "Workday Shifts" OR DE "Work Rest Cycles" OR DE "Task Complexity" OR DE "Work Load" OR DE "Downsizing" OR DE "Electronic Communication" OR DE "Communication Systems" OR DE "Virtual Teams" OR DE "Telecommuting" OR DE "Social Support" OR DE "Cooperation" OR DE "Computer Mediated Communication" OR DE "Employee Interaction" OR DE "Bullying" OR DE "Cyberbullying" OR DE "Group Cohesion" OR DE "Leadership Style" OR DE "Leadership Qualities" OR DE "Leader Member Exchange Theory" OR DE "Role Conflicts" OR DE "Professional Role" OR DE "Role Perception" OR DE "Working Conditions" OR DE "Noise Levels (Work Areas)" OR DE "Occupational Exposure" OR DE "Noise Effects" OR DE "Luminance" OR DE "Hazardous Materials" OR DE "Human Factors Engineering" OR DE "Working Space" OR DE "Quality of Work Life" OR DE "Human Machine Systems Design" OR DE "Human Machine Systems" OR DE "Computer Applications" OR DE "Work-Life Balance" OR DE "Occupational Mobility" OR DE "Family Work Relationship"
S6	( TX "compassion fatigue" OR TX ((emotion*) AND (labor OR labour OR demand* OR dissonance OR exhaustion OR work OR regulation)) OR TX "mental fatigue" OR TX satiation OR TX "emotional labor" OR TX "emotional labour" OR TX "emotion* work" OR TX "emotion* management" OR TX "emotional demand" OR TX "emotional dissonance" OR TX "emotion-rule dissonance" OR TX "emotion rule dissonance" OR TX "emotive dissonance" OR TX "Surface Acting" OR TX "Deep Acting" OR TX "emotion* suppression*" OR TX emotionale Belastung* OR TX Emotionsregulation OR TX Emotionsmanagement OR TX Emotionsarbeit OR TX Gefühlsarbeit OR TX Gefuehlsarbeit OR TX Interaktionsarbeit OR TX "Emotionale Inanspruchnahme" ) OR ( TX qualification* OR TX "job knowledge" OR TX "work education*" OR TX education* qualit* OR TX professional competence* OR TX technical expertise* OR TX professional expertise* OR TX "lack of expertise" OR TX job training OR TX "on-the-job training" OR TX "manpower training" OR TX occupational training* OR TX (vocational AND (training* OR education*)) OR TX aspiration level* OR TX knowledge level* OR TX Qualifikation OR TX Überforderung OR TX Ueberforderung OR TX Unterforderung OR TX Einarbeitung OR TX Einweisung OR TX Anspruchsniveau OR TX Wissensstand OR TX Kenntnisstand OR TX "learning by doing" OR TX "Lernen am Arbeitsplatz" OR TX "Lernen im Arbeitsprozess" ) OR ( TX responsibility OR TX responsibilities OR TX "sense of responsibility" OR TX remit OR TX "area of responsibility*" OR TX "field* of activity" OR TX "field* of work" OR TX assignment OR TX job description OR TX "range* of task*" OR TX "diffusion of responsibility" OR TX role conflict* OR TX professional* identit* OR TX "job role*" OR TX occupational role* OR TX "professional role*" OR TX "work role*" OR TX "command structure" OR TX command structures OR TX "flat organisation" OR TX "flat organisations" OR TX "flat organization" OR TX "flat organizations" OR TX "horizontal organisation" OR TX "horizontal organisations" OR TX "horizontal organization" OR TX "horizontal organizations" OR TX level hierarch* OR TX "no clear hierarch*" OR TX "flat hierarch*" OR TX "flat hierarchical structure*" OR TX accountability OR TX Kompetenz* OR TX Verantwortung OR TX "unklare Verantwortung" OR TX Verantwortungsdiffusion OR TX "kollektive Verantwortlichkeit" OR TX "mangelnde Hierarchie*" OR TX "flache Hierarchie*" OR TX Verantwortlichkeit ) OR ( TX information* volume OR TX information-volume OR TX information* quantit* OR TX information* qualit* OR TX missing data OR TX "lack of information" OR TX missing information* OR TX inadequate information* OR TX "information overload" OR TX stimulus satiation OR TX overstimulation OR TX "sensory overload" OR TX "information system*" OR TX data display OR TX Information* OR TX (Information* AND (Entdeckbarkeit OR Ablenkungsfreiheit OR Unterscheidbarkeit OR Interpretierbarkeit OR Kompaktheit OR Konsistenz)) OR TX Informationsgehalt OR TX Informationsqualität OR TX Informationsqualitaet OR TX Informationsangebot OR TX Informationsmenge OR TX "fehlende" Information*" OR TX Reizüberflutung OR TX Reizueberflutung OR TX Informationsdarstellung OR TX (Information

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AND Reizüberflutung ) OR ( TX monotony OR TX task variety OR TX task variabilit\* OR TX repetitiveness OR TX "repetitive work" OR TX "repetitive task\*" OR TX "repetitive job\*" OR TX "monotonous work" OR TX "monotonous task\*" OR TX "monotonous job\*" OR TX Variabilität OR TX Variabilität OR TX Abwechslungsreichtum OR TX Aufgabenvariabilität OR TX Aufgabenvariabilität OR TX Aufgabenvielfalt OR TX Tätigkeitswechsel OR TX Taetigkeitswechsel OR TX Monotonie OR TX repetitive\* Arbeit\* OR TX repetitive\* Tätigkeit\* OR TX repetitive\* Taetigkeit\* OR monotone Tätigkeit\* OR monotone Taetigkeit\* OR TX monoton\* Arbeit\* OR TX kurze Takte ) OR ( TX job control OR TX job demand\* OR TX "freedom of action" OR TX (freehand AND (work\* OR job\* OR task\*)) OR TX "freedom to operate" OR TX decision latitude OR TX autonomy OR TX job crafting OR TX "influence at work" OR TX "influence on task" OR TX task order OR TX skill discretion OR TX job discretion OR TX boredom OR TX active job\* OR TX Handlungsspielraum OR TX Entscheidungsspielraum OR TX Gestaltungsspielraum OR TX Entscheidungsautorität OR TX Tätigkeitsermessen OR TX Taetigkeitsermessen OR TX Autonomie OR TX Kontrollerleben ) OR ( TX job content OR TX job characteristic\* OR TX Arbeitsinhalt OR TX Arbeitsaufgabe OR TX "self-managing work team\*" OR TX job enrichment OR TX task complexit\* OR TX work simplification OR TX "freedom of action" OR TX ((repetitiv\* OR repetitious) AND (work OR task\* OR job\*)) OR TX "job rotation\*" OR TX (monoton\* AND (work\* OR task\* OR job\*)) OR TX action regulation OR TX task identit\* OR TX task signific\* OR TX task order\* OR TX job complexit\* OR TX work complexit\* OR TX Tayloris\* OR TX Toyotis\* OR TX "selfmanag\* team\*" OR TX "self-manag\* work\* team\*" OR TX job enlargement\* OR TX job rotation\* OR TX "self-directed work group\*" OR TX "self-managing work group\*" OR TX autonom\* group\* OR TX "autonomous groups" OR TX "autonomous work group" OR TX "autonomous work groups" OR TX "self-directed work team\*" OR TX "work team\*" OR TX cross-functional team\* OR TX Aufgabenerweiterung OR TX Aufgabenbereicherung OR TX Vollständigkeit OR TX vollständige Tätigkeit OR TX vollstaendige Taetigkeit OR TX (Einfluss AND Arbeitsinhalt OR Arbeitspensum) OR TX Ganzheitlichkeit OR TX Handlungsregulation OR TX Tätigkeitsbewertung\* OR TX Taetigkeitsbewertung\* OR "vollständige Aufgabe\*" OR TX "vollstaendige Aufgabe\*" OR TX autonome Arbeitsgruppe\* OR TX teilautonome Arbeitsgruppe\* )

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S5 ( TX "task performance and analysis" OR TX workload OR TX workflow OR TX "qualitative workload" OR TX "quantitative workload" OR TX "time pressure" OR TX "mental demands" OR TX "mental demand" OR TX "job demand\*" OR TX "job control" OR TX interruption OR TX interrupt\* OR TX intrusion\* OR TX distraction\* OR TX disturbance OR TX "being under pressure" OR TX "under pressure" OR TX "fluctuating workload\*" OR TX "forced pacing" OR TX "hectic work" OR TX "speed of work" OR TX "temporal demand\*" OR TX "time demand\*" OR TX "time pressure" OR TX "time strain" OR TX "too much work" OR TX "quantitative demand\*" OR TX "quality demand\*" OR TX "work quantity" OR TX "work complexity" OR TX "work demand\*" OR TX "work intensity" OR TX "work intensification" OR TX "work overload" OR TX "work pace" OR TX "work pressure" OR TX "work speed" OR TX "mental workload" OR TX "work load" OR TX "labor intensity" OR TX "labour intensity" OR TX "job strain" OR TX "work cycle" OR TX "work-cycle" OR TX "paced work" OR TX "line work" OR TX "line-work" OR TX "clocked work" OR TX "clocked-work" OR TX "work intermissions" OR TX "electronic communication" OR TX communication OR TX collaboration OR TX coloboration OR TX "organizational climate" OR TX "psychosocial work environment" OR TX eteams OR TX E-Teams OR TX "virtual work teams" OR TX "virtual work team" OR TX "virtual team\*" OR TX VTEAMS OR TX v-team\* OR TX "remote leadership" OR TX Gruppenkohäsion OR TX Gruppenkohaesion OR TX Kooperation OR TX Zusammenarbeit OR TX "virtuelle Teams" OR TX "Arbeitsklima" OR TX Kommunikation" OR TX Zeitdruck OR TX hohe Arbeitsintensität OR TX Arbeitsintensitaet OR TX Störungen OR TX Stoerungen OR TX Unterbrechungen OR TX hohe Taktbindung ) OR ( "work week length" OR TX "work scheduling" OR TX "personnel staffing and scheduling" OR TX "work rest cycle\*" OR TX "work schedule tolerance" OR TX fixed-term employment OR TX leisure OR TX night work OR TX controidisruption OR TX desynchronisation\* OR TX desynchronization\* OR TX resynchronisation OR TX resynchronization OR TX disturbance OR TX synchronisation\* OR TX synchronization OR TX circadian OR TX SCN OR TX chrono\* OR "clockwork"[Text Word] OR TX ((clock-synchronous OR clock-actuated OR clock-controlled) AND (work OR task\* OR job\*)) OR TX shiftwork\* OR TX shift work\* OR TX "workday shifts" OR TX "shift system\*" OR TX "shift rotation\*" OR TX "night shift" OR TX "irregular working hour\*" OR TX night work\* OR TX "flexible working hour\*" OR TX "flexible work hour\*" OR TX "flexible working arrangement\*" OR TX "flexibilit\* in the scheduling of hour\* worked" OR TX "flexibilit\* in the amount of hour\* worked" OR TX ("flexibility" AND "working time") OR TX "irregular working hour\*" OR TX "irregular work hour\*" OR TX "irregular working time" OR TX ("working hour\*" AND (variabilit\* OR flexibilit\*)) OR TX flexitime OR TX flextime OR TX "on-call work\*" OR TX "on-call service" OR TX "emergency service" OR TX "on-call duty" OR TX "standby duty" OR TX "active standby" OR TX "standby service" OR TX "work-privacy-conflict" OR TX work privacy conflict\* OR TX job family relationship\* OR TX work family relationship\* OR TX "Family Work Relationship" OR TX "work-family- balance" OR TX work famil\* balance OR TX "work-life-balance" OR TX compatibility of family and job OR TX work-life balance OR TX (work\* AND (famil\* OR home OR leisure OR life OR nonwork OR non-work OR priva\* OR balanc\* OR compatibility OR conflict\* OR enhanc\* OR enrich\* OR facilitat\* OR interact\* OR inter\* OR spillover OR tension)) OR TX Schichtarbeit OR TX "Arbeit-Ruhe-Rhythmen" OR TX Arbeitswochenlänge OR TX lange Arbeitszeit OR TX Arbeitszeiteinteilung OR TX Nachtarbeit OR TX Schichtarbeit OR TX Schichtdienst OR TX Schichtplanung OR TX Überstunden OR TX Gleitzeit OR TX Nachtschicht OR TX Wechselschicht OR TX (rollierend\* AND (Schicht\* OR System)) OR TX "flexible Arbeitszeit\*" OR TX "Flexibilität der Arbeitszeit" OR TX (Arbeitszeit AND (Flexibilität OR Variabilität)) OR TX "Variabilität der Arbeitszeit" OR TX "Arbeitszeitflexibilisierung" OR TX Arbeitszeitgestaltung OR TX "Arbeit auf Abruf" OR TX Rufdienst OR TX Bereitschaftsdienst OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie\*" OR TX "Work-Life-Balance" OR TX "long working hour\*" OR TX "Twenty-four/seven" OR TX "extended shift" OR TX "extended shifts" OR TX "12-

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hour shift\*\* OR TX "10-hour shifts\*\* OR TX "7-day service\*\* OR TX "irregular working hour\*\* OR TX "work hour\*\* OR TX hours worked OR TX job hours OR TX work time OR TX workhours OR TX working hours OR TX long hours OR TX overwork OR TX "extended work" OR TX working overtime OR TX overtime work OR TX overtime OR TX "long work hour\*\* OR TX "long working hour\*\* OR TX "compressed weeks" OR TX "job hour\*\* OR TX Überstunden OR TX Mehrarbeit OR TX Wochenstunden OR TX "lange Arbeitszeit" OR TX "lange Arbeitszeiten" OR TX "12-Stunden-Schicht\*\* OR TX "lange Schicht\*\* OR TX "verlängerte Arbeitszeit" OR TX "verkürzte Wochen" OR TX "break time\*\* OR TX intermission\* OR TX intermittent breaks OR TX intermittent rest OR TX lull OR TX lulls OR TX "non-working time\*\* OR TX "work to rest" OR TX "off time\*\* OR TX off-time OR TX pausing OR TX recess OR TX "recovery period\*\* OR TX "recovery time\*\* OR TX "rest break" OR TX "rest breaks" OR TX "rest pause\*\* OR TX "sufficient break\*\* OR TX "sufficient rest\*\* OR TX "time out\*\* OR TX work break\* OR TX work pause\* OR TX work rest OR TX recovery opportunity OR TX recovery opportunities OR TX pause OR TX pauses OR TX repose\* OR TX respite\* OR TX "break schedule\*\* OR TX "rest cycle\*\* OR TX "rest schedule\*\* OR TX "amount of rest" OR TX "number\* of breaks" OR TX break\* frequenc OR TX rest frequency OR TX rest frequencies OR TX break period\* OR TX brief pause\* OR TX brief rest OR TX "long break" OR TX "long breaks" OR TX "long pause\*\* OR TX "long rest\*\* OR TX "micro break\*\* OR TX microbreak\* OR TX "mini break\*\* OR TX "pause\* length\*\* OR TX "pause\* duration\*\* OR TX "rest allowance\*\* OR TX rest duration OR TX rest length OR TX rest period\* OR TX short break\* OR TX break organization\* OR TX break organisation\* OR TX "break\* structure\*\* OR TX "pause\* pattern\*\* OR TX "rest design\*\* OR TX "rest interval\*\* OR TX "rest pattern\*\* OR TX "planned rest\*\* OR TX "regular break\*\* OR TX "regular rest\*\* OR TX "scheduled break\*\* OR TX "scheduled rest\*\* OR TX "active break\*\* OR TX "active pause\*\* OR TX "active recover\*\* OR TX "active rest" OR TX "brief exercise\*\* OR TX "exercise break" OR TX "exercise\* breaks" OR TX "exercise rest" OR TX "exercise rests" OR TX stretching exercise\* OR TX afternoon nap\* OR TX passive recovery OR TX power nap\* OR TX relaxation time\* OR TX "sit-down" OR TX breather\* OR TX nap OR TX napping\* OR TX naps OR TX siesta\* OR TX slumber\* OR TX snooze\* OR TX "coffee break" OR TX "coffee breaks" OR TX "tea break\*\* OR TX "smoking breaks" OR TX "lunch break" OR TX "lunch breaks" OR TX "lunch hour\*\* OR TX "lunchtime\*\* OR TX "lunch time\*\* OR TX "lunch-time" OR TX "meal breas" OR TX "midday break" OR TX "morning break" OR TX "meal time\*\* OR TX mealtime\* OR TX "break room\*\* OR TX "recovery room\*\* OR TX "missed breaks" OR TX "missed breaks" OR TX "recovery time" OR TX Schlaf\* OR TX Erholung OR TX (Ruhe\* NOT Ruhestand\*) OR TX Paus\* OR TX Rast\* OR TX "Arbeit-Ruhe-Rhythmen" OR TX Nap\* OR TX Frühstück\* OR TX Fruestueck\* OR TX Auszeit OR TX Schlummer\* OR TX Arbeitspause\* OR TX Kurzpaus\* OR TX Mittagspause\* OR TX Dösen OR TX Doesen OR TX Mittagessen OR TX stretching OR TX Vesper\* OR TX Atempause\* OR TX Mittagsschlaf\* OR TX Mittagsschläfchen OR TX Mittagsschlaefchen OR TX Bewegungspau\* OR TX Arbeits-Erholungs\* OR TX Kaffeepaus\* OR TX Nickerchen OR TX Zigarettenpause\* OR TX Regenerationsphase\* OR TX Imbiss\* OR TX Verschnaufpause\* OR TX Regenerationspaus\* OR TX Auszeit OR TX Büroschlaf\* OR TX Bueroschlaf\* OR TX Büroschläfchen OR TX Bueroschlaefchen OR TX Pausenregime )

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S4

( TX "supervisor employee interaction" OR TX "labor management relation\*\* OR TX "labour management relation" OR TX "leadership" OR TX supervisor OR TX middle manag\* OR TX middle level manag\* OR TX "manager employee interaction" OR TX "manager-employee-interaction" OR TX ((leader OR leadership OR supervisor OR supervisory) AND (qualities OR quality OR style OR behavior OR behaviour OR skill OR skills OR characteristics OR characteristic OR traits OR attributes OR personality OR attitude OR abu-sive OR destructive OR aggressive OR negative OR tyrannic\* OR undermining OR psychopathic OR toxic OR despotic OR "laissez faire" OR passive OR narcissistic OR transformational OR transactional OR charismatic OR "health-specific" OR "health-domain" OR "health-oriented" OR authentic OR "ethical" OR shared OR servant OR distributed OR collective OR consensus OR climate)) OR TX "abusive supervision" OR TX "petty tyranny" OR TX "petty authority" OR TX "petty power" OR TX "leader member exchange" OR TX "leader-member-exchange" OR TX "LMX" OR TX "superior-subordinate relationship" OR TX "superior subordinate relationship" OR TX Rückmeldung OR TX Rueckmeldung OR TX "Kenntnis der Ergebnisse" OR TX Monitoring OR TX Selbstregulation OR TX Überwachen OR TX Ueberwachen OR TX Vorgesetzten-Untergebenen-Interaktion OR TX Führungsstil OR Fuehrungsstil OR TX Führung OR TX Fuehrung OR TX "Remote Leadership" OR TX "Vorgesetzte\*\* OR TX Teamleiter OR TX Teamleitung OR TX "gesunde Führung" OR TX "gesunde Fuehrung" OR TX "gesund Führen" OR TX "ungesunde Fuehrung" OR TX "gesund Fuehren" OR TX "ungesunde Fuehrung" OR TX ((auritär\* OR autoritaer\* OR direktiv\* OR kooperativ\* OR partizipativ\* OR coachend\* OR situativ\* OR narzistisch\* OR gesundheitsorientier\* OR authentisch\* OR geteilt\* OR tyrannisch\* OR aggressiv\* OR charismatisch\* OR willkürlich\* OR willkuerlich\* OR engstirnig\*)) AND (Führung OR Fuehrung OR Führungsstil OR Fuehrungsstil OR Vorgesetzte\*)) OR TX feedback OR TX "knowledge of result\*\* OR TX "performance monitoring" OR TX "task\* monitoring" OR TX "supervisory monitoring" OR TX "supervisor monitoring" OR TX "work monitoring" OR TX "job monitoring" OR TX "monitoring at work" OR TX self-regulat\* OR TX "action regulation" OR TX "effort reward" OR TX "effort-reward" OR TX "effort reward imbalance" OR TX "effort-reward imbalance" OR TX overcommitment OR TX "gratification crisis" OR TX justice OR TX injustice OR TX fairness OR TX "relational justice" OR TX "organizational justice" OR TX "organizational injustice" OR TX "organizational justice" OR TX "organisational injustice" OR TX "distributive justice" OR TX "distributive injustice" OR TX "procedural justice" OR TX "procedural injustice" OR TX "interactional justice" OR TX "interactional injustice" OR TX Rückmeldung OR TX Rueckmeldung OR TX Handlungsregulation\* OR TX Gratifikationskrise OR TX Ungerechtigkeit OR TX "organisationale Gerechtigkeit" OR TX "organisationale Ungerechtigkeit" OR TX "fehlende Anerkennung" OR TX Entlohnung OR TX Wertschätzung OR TX Wertschaetzung OR TX Feedback OR TX Anerkennung OR TX Gerechtigkeit OR TX Fairness OR TX Glaubwürdigkeit OR TX Glaubwuerdigkeit OR TX Verlässlichkeit OR TX Verlaesslichkeit ) OR ( TX social networking OR TX social environment\* OR TX workplace team\* OR TX "demand control support" OR TX

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"social support" OR TX ((leader OR co-worker OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague\*) AND support) OR TX "social buffering" OR TX "social relations" OR TX coworker relationship OR TX "social relation" OR TX "social relationship" OR TX "social relationships" OR TX "interpersonal relation" OR TX "interpersonal relations" OR TX "interpersonal relationship" OR TX "interpersonal relationships" OR TX "competitive behavior" OR TX "competitive behaviour" OR TX mobbing OR TX bullying OR TX "workplace bullying" OR TX harassment OR TX hostile OR TX hostility OR TX teasing OR TX "aggressive behavior" OR TX "aggressive behaviour" OR "workplace violence" OR TX victimization OR TX victimisation OR TX "social isolation" OR TX ((social OR workplace OR team) AND (climate OR conflict OR conflicts OR "social stress\*")) OR TX "supervisor employee interaction" OR TX ((co-worker OR coworker OR workmate OR supervisor OR superior OR "fellow worker" OR principal OR associate OR colleague) AND interaction) OR TX "group cohesion" OR TX cooperation OR TX cooperative OR TX collaboration OR TX collaborative OR TX "team work" OR TX "work teams" OR TX "soziale Beziehung\*" OR TX "Soziale Unterstützung" OR TX Mitarbeiterunterstützung OR TX ((Mitarbeiter OR Kollege OR Kollegen OR Vorgesetzter OR Vorgesetzte) AND (Unterstützung OR Unterstuetzung) OR TX "zwischenmenschliche Beziehung" OR TX "zwischenmenschliche Beziehungen" OR TX Gruppenzusammenhalt OR TX Teamzusammenhalt OR TX "soziales Klima" OR TX Teamklima OR TX "Klima im Team" OR TX Arbeitsklima OR TX Belästigung\* OR TX Belaestigung\* OR TX Feindseligkeit OR TX Feindseligkeiten OR TX "aggressives Verhalten" OR TX "Gewalt am Arbeitsplatz" OR TX Mobbing OR TX Schikane OR TX schikanieren OR TX "soziale Isolation" OR TX Ausgrenzung OR TX Ausgrenzungen OR TX Konflikt OR TX Konflikte OR TX sozialer Stress\* )

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S3

( TX "human-machine System\*" OR TX "human machine\* System\*" OR TX "man-machine" OR TX telecooperation OR TX "man-machine systems" OR TX "man machine system\*" OR TX "human-computer interaction" OR TX "human-robot interaction" OR TX "human-robot system" OR TX "human-robot cooperation" OR TX "human engineering" OR TX "human factors engineering" OR TX "expert systems" OR TX "decision support system\*" OR TX "automatic data processing" OR TX automation OR TX "computer-based work" OR TX "user performance" OR TX screen OR TX "data-entry task" OR TX "data entry task" OR TX computer\* OR TX "Intelligent Systems" OR TX "information technology" OR TX "information systems" OR TX "communication systems" OR TX "communication technology" OR TX "communications media" OR TX "computer mediated communication" OR "electronic communication" OR "electronic device\*" OR "mobile device\*" OR "mobile phone" OR "digital telephone" OR Digitaltelefon OR "wireless device" OR "wireless telephone" OR TX "cell phone" OR TX "cell telephone" OR TX "cellular phone" OR TX handheld OR "portable device" OR TX pager OR TX smartphone OR TX blackberry OR TX "iPhone" OR TX chat OR TX "electronic mail\*" OR TX "e-mail\*" OR TX MMS OR TX "instant messag\*" OR TX "short messag\*" OR TX "SMS" OR TX "ict" OR TX "IKT" OR TX "ict use" OR TX "Information media" OR TX "Information and communication media" OR TX "information technology" OR TX "IOS" OR TX android OR TX "social media" OR TX supplemental OR TX telecommuting OR TX "use of technology\*" OR TX "strategies of compatibility" OR TX "software usability" OR TX software ergonomics OR TX "user interface\*" OR TX "interface design" OR TX visualization OR TX visualisation OR TX visualisation system OR TX visualization system OR TX dialogue OR TX dialog OR TX "computer input device\*" OR TX "computer output device\*" OR TX screen OR TX display OR TX mouse OR TX keyboard OR TX track ball OR TX tablet OR TX touch screen OR TX scanner OR TX "human computer interaction" OR TX usability OR TX Mensch-Computer-Interaktion OR TX "Mensch Computer Interaktion" OR TX Arbeitsmittel OR TX "Mensch-Maschine-Systeme" OR TX "Mensch Maschine Systeme\*" OR TX "Mensch-Roboter-Interaktion" OR TX "Mensch Roboter Interaktion" OR TX "Mensch-Roboter-Systeme" OR TX "Mensch Roboter Systeme" OR TX "Mensch-Roboter-Kooperation" OR TX "Mensch Roboter Kooperation" OR TX Ergonomie OR TX Expertensystem OR TX Software-Ergonomie OR TX Kommunikationssysteme OR TX Kommunikationstechnologien OR TX "Informations- und Kommunikationstechnologien" OR TX Mobiltelefon OR TX Handy OR TX Digitaltelefon OR TX ((Gerät\* OR Geraet\*) AND (tragbare\* OR schnurlos\* OR kabellos OR mobil\* OR elektronisch\*)) OR TX Handgerät OR TX Handgeraet OR Mobilfunkempfänger OR TX Mobilfunkempaenger OR TX Kommunikationsmedien OR TX "computergestützte Kommunikation" OR TX "computergestuetzte Kommunikation" OR TX "elektronische Kommunikation" OR TX Telekommunikation OR TX Informationstechnologie OR TX Informationssysteme OR TX "Informations und Kommunikationsmedien" OR TX Informationsmedien OR TX "IKT Nutzung" OR TX erreichbar OR TX Erreichbarkeit OR TX Kurznachrichten OR TX Bildnachrichten OR TX "elektronische Post" OR TX Kurznachrichtendienst OR TX "soziale Medien" OR TX "Technologie Nutzung" OR TX „Software Gebrauchstauglichkeit" OR TX Software-Ergonomie OR TX Software OR TX Benutzerschnittstelle OR TX Dialoggestaltung OR TX Informationsdarstellung OR TX Benutzerführung OR TX Benutzerfuehrung OR TX Dialogführung OR TX Dialogfuehrung OR TX "Computer Eingabegerät\*" OR TX "Computer Ausgabegerät\*" OR TX "Computer Eingabegeraet\*" OR TX "Computer Ausgabegeraet\*" OR TX Bildschirm OR TX "visuelle Informationsdarbietung" OR TX Maus OR TX Tastatur OR TX Trackball OR TX Tablet OR TX Touchscreen OR TX Scanner OR TX "Mensch-Computer-Interaktion" OR TX Informationssystem\* ) OR ( TX "process control" OR TX "supervisory control" OR TX "video display" OR TX "visual display" OR TX "video display units" OR TX "computer terminals" OR TX "data display" OR TX "assembly line" OR TX "conveyor belt" OR TX "working space" OR TX workspace OR TX "work space\*" OR TX "work equipment" OR TX "ergonomic\* device\*" OR TX "working materials" OR TX "work material\*" OR TX "work tool\*" OR TX "working tool\*" OR TX Mensch-Computer-Interaktion OR TX "computerunterstützte Entscheidungshilfen" OR TX "automatisierte Informationsverarbeitung" OR TX Automation OR TX Prozesskontrolle OR TX "überwachende Kontrolle" OR TX "ueberwachende Kontrolle" OR TX "visuelle Informationsdarbietung" OR TX Fließband OR TX "ungünstige Arbeitsräume" OR TX unguenstige Arbeitsraeume OR TX räumliche Enge OR TX raemliche Enge OR TX (Gestaltung AND Signale\* OR Hinweise\*)) OR ( TX Ergonomics OR TX "human factors engineering" OR TX "physical

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stress" OR TX "physical factor" OR TX "physical factors" OR TX "physical work" OR TX Ergonomie OR TX ergonomische Gestaltung OR TX Arbeitsplatzgestaltung OR TX "körperliche Arbeit" OR TX "körperliches Arbeiten" OR TX "physische Arbeit" OR TX physische Faktoren ) OR ( TX "working conditions" OR TX "work\* environment" OR TX Arbeitsbedingungen OR TX Arbeitsumgebung OR TX hazard\* OR TX "hazardous materials" OR TX "occupational exposure" OR TX ergonomics OR TX "noise level\*" OR TX nois\* OR TX acoustic\* OR TX sound\* OR TX "irrelevant speech" OR TX "background speech" OR TX Lärm OR TX Laerm OR TX Schall OR TX Hintergrundgeräusch OR TX Hintergrundgeraeusch OR TX Hintergrundbeschallung OR TX Hintergrundstimmen OR TX Lärmpegel OR TX Laermpegel OR TX Geräuschpegel OR TX Geraeuschpegel OR TX Nebengeräusch OR TX Nebengeraeusch OR TX vibration\* OR TX whole-body vibration\* OR TX hand-arm vibration\* OR TX "hand arm vibration\*" OR TX Vibration\* OR TX Ganzkörpervibration\* OR TX Ganzkoerpervibration\* OR TX Ganz-Körper-Vibration\* OR TX Ganzkörper-Vibrationen OR TX Ganzkoerper-Vibrationen OR TX „indoor climate\*" OR TX „indoor environment\*" OR TX "room climate\*" OR TX "indoor air temperatur\*" OR TX "indoor temperatur\*" OR TX "operative temperatur\*" OR TX "air velocity\*" OR "indoor air velocity\*" OR humidity\* OR „dry air“ OR "moisture skin\*" OR "eye blink\* frequency\*" OR "office eye syndrom\*" OR („thermal comfort\*" OR „thermal comfort\* room\*" OR „comfortable climate\*" OR "draught risk"OR turbulence\* OR surface temperature" OR "radiant temperature asymmetry" OR "radiant temperature" OR "Temperature Perception\*") OR ("natural ventilation\*" OR "air-condition\*" OR "aircondition\*" OR "air condition\*" OR cooling\* OR ventilation\* OR HVAC heat\* OR "heat stress" OR "heat strain\*" OR "heat radiation\*" OR cold\* OR "cold\* stress" OR acclimatization\* OR TX Effektivtemperatur OR TX Normal-Effektivtemperatur OR TX Basis-Effektivtemperatur OR TX Raumtemperatur OR TX Raumlufttemperatur OR Oberflächentemperatur" OR TX Oberflaechentemperatur"OR TX Oberflaechentemperatur OR TX Zugluft" OR TX "störender Luftzug\*" OR TX "stoerender Luftzug\*" OR TX Raumluftgeschwindigkeit" OR TX Klimatechnik\* OR TX Turbulenz\* OR Strahlungsasymmetrie\* OR Klimatechnik\* OR Luftfeuchtigkeit\* OR "trockene Luft" OR Raumklima\* OR „thermischer Raumkomfort" OR TX "raumklimatisch\* Bedingung\*" OR TX Raumklimasituation OR TX Raumklimasituationen OR TX Zugluftrisiko\* OR TX Behaglichkeit\* OR TX Hitzestress OR TX Wärmestrahlung OR TX Waermestrahlung OR TX Kälte OR TX Kaelte OR TX Akklimatisation OR TX Akklimatisierung OR TX Hitze OR TX ((\*light\* OR illumi\* OR \*photo\* OR lumi\*) AND (view OR discomfort OR eyestrain OR asthenop\* OR complain\* OR window\* OR controldisruption OR desynchronisation\* OR disturbance OR \*synchronisation\* OR circadian OR SCN OR chrono\* OR clock OR Suprachiasmatic OR sleep OR \*work\* OR occupation\* OR office OR deprivation OR entrain\* OR misalign\*)) OR TX Beleuchtung OR TX Lichtwirkung OR TX Licht OR TX Zeitgeber OR TX Disruption )

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S2

( TX "Job Family Relationship" OR TX "Work Family Relationship" OR TX "Work-family balance" OR TX "work-life-balance" OR TX "compatibility of family and job" OR TX "compatibility of family and profession" OR TX "compatibility of family and career" OR TX "work-life balance" OR TX "Family Work Relationship" OR TX ((work\*) AND (famil\* OR home OR leisure OR life OR nonwork OR non-work OR priva\*)) AND (balanc\* OR compatibility OR conflict\* OR enhanc\* OR enrich\* OR facilitat\* OR interact\* OR interf\* OR spillover OR tension)) OR TX Work-privacy-conflict OR TX "work privacy conflict" OR TX work-privacy conflict\* OR TX "WPC" OR TX work-home conflict OR TX workaholism OR TX "Vereinbarkeit von Beruf und Familie" OR TX "Vereinbarkeit von Familie und Beruf" OR TX "Familie-Beruf-Koordinierung" OR TX "Beruf-Familie" OR TX "Work-Life-Balance" OR TX "Work-Life Balance" OR TX (Vereinbarkeit AND (Familie OR Beruf OR Arbeit)) ) OR ( TX "flexible work arrangements" OR TX flexible employ\* OR TX "flexible employment contract\*" OR TX "flexible work contract\*" OR TX contingent employ\* OR TX contingent work\* OR TX atypical work\* OR TX atypical employ\* OR TX "non-standard work\*" OR TX nonstandard work\* OR TX "non-standard employ\*" OR TX nonstandard employ\* OR TX "non-regular employ\*" OR TX "non-permanent employ\*" OR TX nonpermanent employ\* OR TX nontraditional employ\* OR TX nontraditional occupation\* OR TX "precarious work\*" OR TX "precarious employ\*" OR TX unstable work\* OR TX unstable employ\* OR TX "employment type\*" OR TX employment contract\* OR TX work contract\* OR TX "temporary employment agency\*" OR TX temporary employ\* OR TX temporary work\* OR TX "agency work\*" OR TX multiple employ\* OR TX "multiple job hold\*" OR TX (moonlighting AND work) OR TX marginal employ\* OR TX short-term contract\* OR TX short-term work\* OR TX "fixed-term contract\*" OR TX "fixed-term employ\*" OR TX "temporary work contract\*" OR TX "part-time staff" OR TX "part-time employ\*" OR TX "part-time work\*" OR TX self-employment OR TX "independent contractors" OR TX freelancer\* OR TX sole traders OR TX casual work\* OR TX casual employ\* OR casual job\* OR TX casual contract\* OR TX contract work\* OR TX seasonal work\* OR TX seasonal employ\* OR TX seasonal occupation\* OR TX multiple job\* OR TX Arbeitnehmerüberlassung OR TX "atypische Beschäftigung\*" OR TX "atypische Beschaeftigung\*" OR TX "atypische Arbeit\*" OR TX Normalarbeitsverhältnis OR TX "prekäre Beschäftigung\*" OR TX "prekaere Beschaeftigung\*" OR TX "flexible Arbeit\*" OR TX "flexible Beschäftigung\*" OR TX "flexible Beschaeftigung\*" OR TX Mehrfachbeschäftigung OR TX Mehrfachbeschaeftigung OR TX "geringfügige Beschäftigung" OR TX "geringfuegige Beschaeftigung" OR TX Minijob OR TX "geringfügig Beschäftigte" OR TX "geringfuegig Beschaeftigte" OR TX "Leiharbeit\*" OR TX "Zeitarbeit\*" OR TX Tagelöhner OR TX Tageloehner OR TX "befristet beschäftigt" OR TX "befristet beschaeftigt" OR TX Teilzeitarbeit OR TX Teilzeitbeschäftigung OR TX Teilzeitbeschaeftigung OR TX ((selbstständig\* OR selbststaendig AND (Arbeit\* OR Beschäftigung\* OR Beschaeftigung\*)) OR TX freiberufl\* ) OR ( TX "occupational mobility" OR TX "Job Mobility" OR TX "Mobility Occupational" OR TX "spatial mobility" OR TX commuting OR TX commute OR TX (work AND travel\*) OR TX "business travel" OR TX "sales force" OR TX "field service" OR TX overnighter OR TX "mobile worker\*" OR TX "adaptability personality" OR TX "Life-Work Imbalance" OR TX "work-life balance" OR TX "work-life-balance" OR TX "on-call work" OR TX "job insecurity" OR TX "job security" OR TX "employment uncertainty" OR TX "job uncertainty" OR TX "flexible work arrangement\*" OR TX "atypical employment" OR TX "flexible employment" OR TX "alternative employment" OR TX "flexible employment" OR TX contract OR TX "temporary work" OR TX "temporary employment" OR TX flexicurity OR TX

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"flexible workers" OR TX "nonstandard work" OR TX "substandard job\*" OR TX "nonstandard employment" OR TX "workplace restructuring" OR TX "part-time job\*" OR TX "labor market segmentation" OR TX "temporary work" OR TX workaholism OR TX "workfamily-border" OR TX "work-home border" OR TX "border theory" OR TX "boundary flexibility" OR TX "boundary management" OR TX "boundary spanning" OR TX "boundary strategies" OR TX "boundary strength" OR "workfamily-border" OR "work-home border" OR TX dislimitation OR TX permeability OR TX segmentation OR TX "remote work" OR TX "telework" OR TX "working at home" OR TX "berufliche Mobilität" OR TX Berufsmobilität OR TX Mobilität OR TX "räumliche Mobilität" OR TX "mobile Arbeit" OR TX Pendeln OR TX Berufspendler OR TX "berufliches Pendeln" OR TX Wochenpendler\* OR TX Tagespendler OR TX Pendelmobilität OR TX Außendienst OR TX erweiterte Erreichbarkeit OR TX Entgrenzung OR TX Durchlässigkeit OR TX Segmentierung OR TX "Grenz\* Theorie" OR TX "Grenze zwischen Arbeit und Privatleben" OR TX Vereinbarkeitsstrategie OR TX Detachment OR Entgrenzung OR "Grenze zwischen Arbeit und Privatleben" OR "entgrenzte Arbeit" OR TX Zeitarbeit OR TX "Flexible Beschäftigungsverhältnisse" OR TX "Flexible Beschaeftigungsverhaeltnisse" OR TX Prekarisierung OR TX "atypische Verträge" OR TX "atypische Vertraege" OR TX "atypische Arbeitsform\*" OR TX Telearbeit OR TX Prekarität OR TX Prekaritaet OR TX "prekäre Arbeit\*" OR TX "prekaere Arbeit\*" OR TX Leiharbeit OR TX Zeitarbeit OR TX "neue Arbeitsformen" OR TX "Flexibilisierung" )

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S1 ( TX ((small OR small-medium OR small-scale OR medium OR medium-sized OR medium sized OR mediumsized OR midsized OR mid-sized OR midsi\* OR micro ) AND (enterprise OR enterprises OR enterpri\* OR busines\* OR business OR businesses OR company OR companies OR workplace OR workplaces)) OR TX "small & medium-sized business" OR TX "small & medium-sized businesses" OR TX Microenterprise\* OR TX "SME" OR TX "SMEs" OR TX "Kleine mittlere Unternehmen" OR TX ((klein\* OR mittelständisch OR mittel OR mittlere\*) AND (Unternehmen OR Betrieb\* OR Firmen OR Firma OR Gewerbe)) OR TX "KMU" OR TX "Kleine Unternehmen" OR TX "Mittlere Unternehmen" OR TX "kleine AND mittlere Betriebe" OR TX "Klein- AND Mittelbetriebe" OR TX "KMB" OR TX "Klein- Mittelunternehmen" OR TX "klein\* mittelgroß\* Unternehmen" OR TX "Kleinstunternehmen" OR TX Kleinstunternehmen ) OR DE "Small Businesses"

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**Table 17** *Excluded studies in Fulltext-Screening*

<b>No</b>	<b>Reference</b>	<b>Reason for Exclusion</b>
1	(April and Pillay 2018)	No full text available
2	(Becke et al. 2010)	Wrong publication type (study protocol)
3	(Bidlan 2005)	No full text available
4	(Boso et al. 2016)	Full text language not English or German
5	(Bossmann et al. 2016)	Population did not comply to EU-definition of SMEs
6	(Brännström et al. 2013)	Population did not comply to EU-definition of SMEs
7	(Bujacz et al. 2018)	Population did not comply to EU-definition of SMEs
8	(Campo et al. 2009)	Population did not comply to EU-definition of SMEs
9	(Choi and Ha 2009)	Full text language not English or German
10	(Claye 2001)	Wrong publication type (Comment, not peer reviewed)
11	(Cocker et al. 2012)	Exposure did not comply with GDA factors
12	(Creedy et al. 2017)	Population did not comply to EU-definition of SMEs
13	(Derlicka and Shahnavaz 2000)	Exposure did not comply with GDA factors
14	(Devereux et al. 2011)	Population did not comply to EU-definition of SMEs
15	(Dixon 2018)	No full text available
16	(Dunham 2005)	No full text available
17	(Edmunds et al. 2013)	Exposure did not comply with GDA factors
18	(Eib et al. 2018)	Population did not comply to EU-definition of SMEs
19	(Fichera et al. 2009)	Full text language not English or German
20	(Flach et al. 2012)	Population did not comply to EU-definition of SMEs
21	(Genaidy et al. 2007)	Population did not comply to EU-definition of SMEs
22	(George and Hamilton 2011)	Population did not comply to EU-definition of SMEs
23	(Gerstenblatt et al. 2014)	Population did not comply to EU-definition of SMEs

24	(Gillen et al. 2017)	Population did not comply to EU-definition of SMEs
25	(Goode et al. 2019)	Population did not comply to EU-definition of SMEs
26	(Grégoire and Lachance 2015)	Population did not comply to EU-definition of SMEs
27	(Hämmig and Bauer 2014)	Population did not comply to EU-definition of SMEs
28	(Hämmig and Bauer 2013)	Population did not comply to EU-definition of SMEs
29	(Hwang and Lee 2014)	Population did not comply to EU-definition of SMEs
30	(Ishii-Kuntz 2013)	Population did not comply to EU-definition of SMEs
31	(Jamal 2009)	Population did not comply to EU-definition of SMEs
32	(Kaewboonchoo et al. 2011)	Population did not comply to EU-definition of SMEs
33	(Kim et al. 2009)	Population did not comply to EU-definition of SMEs
34	(Kim et al. 2014)	Population did not comply to EU-definition of SMEs
35	(Kjaer et al. 2014)	Population did not comply to EU-definition of SMEs
36	(Krajewski et al. 2011)	Population did not comply to EU-definition of SMEs
37	(Krajewski et al. 2010)	Population did not comply to EU-definition of SMEs
38	(Kucera and McDonald 2010)	Population did not comply to EU-definition of SMEs
39	(Kuoppala and Kekoni 2013)	Population did not comply to EU-definition of SMEs
40	(Lamb and Kwok 2016)	Population did not comply to EU-definition of SMEs
41	(Lindström 2004)	Wrong publication type (commentary)
42	(Martin et al. 2009)	Wrong publication type (study protocol)
43	(McShane and Quirk 2009)	Population did not comply to EU-definition of SMEs
44	(Mekhan't'ev et al. 2016)	Full text language not English or German)
45	(Menzel et al. 2015)	Population did not comply to EU-definition of SMEs
46	(Morganson et al. 2017)	Population did not comply to EU-definition of SMEs
47	(Nakata 2011)	No full text available
48	(Nielsen et al. 2016)	Population did not comply to EU-definition of SMEs
49	(Ofei-Dodoo et al. 2018)	Population did not comply to EU-definition of SMEs

50	(Packebusch 2009)	No full text available
51	(Park et al. 2011)	Population did not comply to EU-definition of SMEs
52	(Park et al. 2009)	Population did not comply to EU-definition of SMEs
53	(Pestoff and Vamstad 2014)	Exposure did not comply with GDA factors, population did not comply to EU-definition of SMEs
54	(Plant and Coombes 2003)	Population did not comply to EU-definition of SMEs
55	(Racz and Wardaszko 2015)	Full text language not English or German
56	(Richardson and Rothstein 2008)	Population did not comply to EU-definition of SMEs
57	(Rigotti et al. 2008)	Population did not comply to EU-definition of SMEs
58	(Robertson 2007)	Wrong publication type (article in magazine, not peer-reviewed)
59	(Rohlf 2018)	Population did not comply to EU-definition of SMEs
60	(Saito et al. 2019)	Population did not comply to EU-definition of SMEs
61	(Sims and Sun 2012)	Population did not comply to EU-definition of SMEs
62	(Takusari et al. 2011)	Population did not comply to EU-definition of SMEs
63	(Teles et al. 2014)	Population did not comply to EU-definition of SMEs
64	(Tsutsumi et al. 2001)	Population did not comply to EU-definition of SMEs
65	(Turunç and Çelik 2010)	Full text language not English or German)
66	(Virgiliis 2014)	Population did not comply to EU-definition of SMEs
67	(Wagstaff and Sigstad Lie 2011)	Population did not comply to EU-definition of SMEs
68	(Waldhauser and Werther 2013)	Population did not comply to EU-definition of SMEs
69	(Weber et al. 2005)	Population did not comply to EU-definition of SMEs
70	(Willingstorfer et al. 2002)	Population did not comply to EU-definition of SMEs
71	(Yosr Ben Tahar 2012)	Population did not comply to EU-definition of SMEs

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